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April 1987

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Radio Control **CAR ACTION**

THE WORLD'S PREMIER R/C CAR MAGAZINE



Tire balancing



**FUTABA
Sport Radio**

Radical!



Project FROG

**Kyosho
STINGER and ULTIMA**



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April 1987

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EDITORIAL

by LOUIS V. DeFRANCESCO JR.



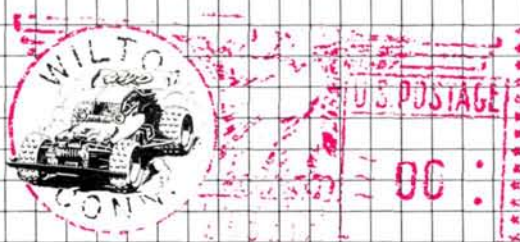
I'VE JUST RETURNED from the International Model Show in Pasadena, California, and it can be reported that R/C car modeling is alive and well. Actually, it's experiencing explosive growth as evidenced by the throngs of R/C car enthusiasts who patronized the show. I saw a lot of new cars and accessories at the show—some that even might start new trends—including MRC/Tamiya's new 1/12-scale off-road Porsche, which we will be featuring next issue along with some really neat new entries into the market.

The diversity of this hobby is most fascinating. Think about it: an R/C car can be modeled after just about any full-scale vehicle out there in a variety of scales, i.e., hot rods, off-road Baja machines, stock cars, drag cars, monster trucks, dirt racers, CanAm machines, the list is seemingly endless. Because of this a lot of new manufacturers are filling these niches with unique products.

With this issue we bring you yet another first—"The Inside Scoop"! This column will feature late-breaking news on the latest developments in the industry, including new products and trends. Our ears will be to the ground and our eyes to the spyglass to get you the latest and hottest in R/C. We've put together another fine issue for you: great Track Reports, informative modeling tips, info on the new Battery Eliminator Circuitry (BEC), Aerodynamics, Tire Balancing, Project Frog, R/C hot rods, and much, much more. Enjoy!

Louis

Letters



Outside Interference

I've just renewed my subscription to *Radio Control Car Action* and I'm looking forward to another year of your fine publication. I'm proud to be one of the founders of our local club—Radio Operated Autos of Danville (ROAD)—which has over 40 members, an indoor track, and a new hobby shop. We're sponsored by the Parks and Recreation Dept. of Danville. Our club has a weekly race, a points championship and we've staged several special races for special events in Danville. Our last big race was at the Harvest Jubilee, sponsored by R. J. Reynolds (Winston Tobacco), in which we awarded over \$1,000 in prizes and trophies. However, we do have a major problem that I hope you and your publication can help with—Radio Interference! Most of our club members' cars have been hit at one time or another, some so severely that we had to D.N.F. the "A" main. It has knocked me out of six races, of which I was top qualifier in three. I know of another club that folded due to this problem, and I feel that if we don't do something a lot more people will leave the hobby. I've sent along a list of steps we've taken to address this problem, some that have helped the car and others that have helped me sleep a little easier.

JOHN ESTLOW
Danville, VA

The list you sent was extensive but focused only on the car and transmitter. You must turn your attention outward since the problem is widespread among your racing buddies. To assume that there's something wrong with all these cars racing is simplistic. If transmitter impound and frequency coordination are observed, there has to be some local source of interference causing all of the trouble. Paging systems and illegally powered linear amplifiers in home CBs each can be a culprit. See if you can

borrow some channel-monitoring equipment to start your investigation. If you find the source, contact the FCC. Our frequencies are ours alone and any unauthorized use is illegal. LVD

4WD Versus 2WD

My friend told me that 4WD is slower than 2WD when using the same motor. Is this true?

ERIC LoVULLO
Rochester, NY

In straightaway speed this is generally true because of the extra drive train components (two differentials, chain or shaft transfer, etc.) found in a 4WD car. Nevertheless, the 4WD will most times be faster around the turns, especially sharp ones, so you're really comparing apples with oranges. Also, that's why 2WD and 4WD cars are separated into two classes. It depends a lot on the track—for example, a 2WD will do better on a fast oval track and a 4WD will excel on a track with lots of turns and short straights.

LVD

R/C Gripes

My brother Greg has been driving me crazy with his cars and his car parts all over the room. So I finally decided to get one of my own!

PAUL PHILLIPS
Brooklyn, NY

Brother Greg has apparently led you down the path of R/C Righteousness! LVD

I've raced competitively for two years with my Kyosho Optima, but I still can't figure out what tires to use on different track surfaces. I'm twelve years old and I love your mag.

BOONE PEABODY
Cabool, MO

We believe that you do love our mag but have no way of knowing if you are really twelve. But seriously, take a look at Mike Lee's "Suspension Systems" in Winter '87 Radio Control Car Action to get some insight on selecting the proper tires for your Optima. LVD

Tamiya Super Champ?

I'm interested in R/C cars, have been for about a year and a half. I'm 73 and started out with a Super Champ from MRC/Tamiya, about which I've got a question. About a year ago, MRC/Tamiya announced that they were going to discontinue the Super Champ because it was too costly to use metal parts in its construction. Now, one year later, I still see Champs selling at hobby shops and being offered in magazine ads. Are they still making them? I also enjoyed your article on the Falcon by Art Schroeder in the Winter '87 issue and your article on the RC-10 in the Summer '86 issue.

KEITH TOBIN
Georgetown, MA

The Super Champ is definitely discontinued. Often, distributors will have a large inventory of a certain car; that's the reason you'll continue to see them after production has stopped. LVD

Bathing in Beautiful R/C

Hello. I'm thirteen and have been in R/C car racing for about three months and I have a question about a car that I'm trying to save up for, the Boomerang, and I was wondering if it's a good-running car in the dirt, on the rocks, and on the street. Also, I admire your magazine and was wondering if in the March/April issue you could put a pull-out picture of a good-looking woman in a two-piece swimsuit standing with the Boomerang, preferably, or any other car.

STEVE NORRIS
Oak Lawn, IL

Replies to Winter '87 Letters

I've been an avid R/C enthusiast for about four months. I first tried asking my parents for an out-of-the-boxer but I bought your mag instead. I took one look at the Hornet in your suspension article and immediately wanted it! But what I wanted to say most about your Winter '87 issue is that I agree with Carlos Garcia about wheelchair access—it's just not fair to not have it.

STEVE LACK
Lisle, IL

Hi Louie, I just finished the Winter '87 issue, and I think your magazine is Great! In regard to Carlos Garcia's letter: A race track open to the public should provide wheelchair access, just like at shopping mall parking lots. I think it should be a rule if the race is invitational. Another thing, Lou, How do you have a company sponsor you? I own three modified cars that finished first and second in main 2WD modified class. Thanks and keep up the great work!

EDDIE SAMPERISI
Lindenhurst, NY

Fellas, thanks for your support of having wheelchair access—support that we're sure your fellow racer appreciates, though many of us, perhaps, take such things for granted. A hobby such as ours should serve to bring people closer together and inconsiderations of this type are Intolerable.

As for sponsorship, you must "network" yourself by going to as many races as possible and attracting as much attention as you can. One way might be to choose a new car or manufacturer that's not yet gained acceptance in racing circles. The established names will not be in as great a need for team racers, but a new name will be more likely to sponsor people on the circuit.

LVD

Steve, turn the Fall '86 issue of Radio Control Car Action to Rich Uravitch's story on the Boomerang. And don't fret, Steve, we'll be featuring more killer chicks—maybe a few radio-controlled—in the mag!

LVD

Pavement Rough-Roaders

I think your magazine is fantastic. It's already been a great help to me. I'd like to make a couple of suggestions. It'd be nice to see some coverage and handling tips for off-road cars racing on pavement. I've been to a lot of road races and every one had at least half the drivers there piloting off-landers. Second, it'd be nice to see a stock motor shootout, possibly using all available \$25 stock off-road motors in the same car to measure performance. Keep up the good mag!

JERRY CASADO
Manteca, CA

We're aware that many R/C enthusiasts are running off-landers on pavement, often quite rough, especially in urban areas. We're putting together a feature on this and one for a motor shootout in an on- and off-road test chassis. So stay tuned!

LVD

Steering You Right!

I really love your track reports. The report on the gas-powered Hunter by Chris Chianelli (Winter '87 issue) encouraged me to buy one. I really like it. I now have two gas-powered cars because of your great track reports. Keep 'em coming!

MIKE BOOHER
Dayton, OH

We welcome your comments, and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 632 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length. We regret that due to the tremendous amount of letters we receive we cannot respond to every one.

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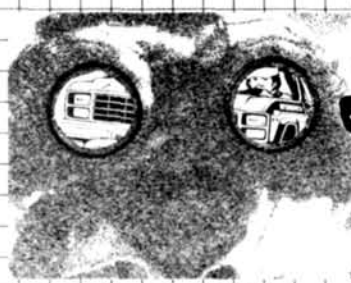
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The Inside Scoop

by CHRIS CHIANELLI

THE R/C car industry is in a fast-pace state of advancement with new products being offered at a head-spinning rate. The number of choices from entry level to all-out competition equipment is ever-increasing. In light of this phenomenon, I'll make the manufacturers nervous and you R/C squirrels who are hungry for info happy by bringing you a special report on security leaks and "late-in" items in the new "Inside Scoop."

RELIABLE sources have told me that the Pacesetter skunk-works in Inglewood, CA, will give rise to an all-new 1/4-scale Formula I racer. With recent trends being what they are at Pacesetter, this will most likely be in the vicinity of a 100 mph car.

* * *



MCALLISTER Racing is well known for their true-to-scale bodies, and their new 1/12-scale Outlaw T-Bird and 1/10-scale '87 Olds Fastback are no exceptions. Watch for these eye-catching beauties in the winner's circle.

* * *

THE NAME Associated has become synonymous with performance, due in part to the fact that the boys from Santa Ana, CA, are never ones to rest on their laurels, so constant improvement is their motto even though they've been in the winner's circle for years. This policy has given rise to the new wider wheel base, high-tech RC12L. This 1/12-scale asphalt competitor features a completely new chassis and other innovations. The fact that this car won first, second,

third and fifth place in world championships is proof in the pudding.

* * *



THE laid-back boys in Brentwood, Tennessee, have recently informed me that the very successful Hobby Lobby Hunter will have a new stable mate, the Tornado. The Tornado incorporates many of the design features that made the Hunter a rugged competitor but has a body instead of a roll cage for those so inclined. Like the Hunter, the Tornado is fully assembled needing only engine and radio installation. Watch for a whirlwind track report coming your way.

* * *



SOME tenacious probing has revealed the existence of MRC/Tamiya's secret Monster Beetle! Details are as yet sketchy but I can tell you it's a true Monster Mud Bug and incorporates many

of Tamiya's time-proven features. By the looks of this beetle, it's built to squash the lesser insects.

* * *

ALSO new from AMRC/Tamiya is a new concept of off-roader, a 1/12-scale 4WD Porche 959 road rally racer. This detailed version of the 1986 Dakar Rally winner features RX540 Technigold motor, shaft drive, and 10 ball bearings just to name a few. Leave it to MRC/Tamiya to venture into an as yet unexplored facet of R/C car racing. Could be the next rage! But wait—there's more Tamiya temptation brewin' in the air! Rumor has it that a new 1/24-scale R/C offering is in the works, complete with radio gear and electric speed control—so stay tuned.

* * *

FOR you Drag Rats a new 1/12-scale electric rail, the Firefox I, will be showing up on the scene from Fine Design of Middletown, NY. The Firefox I will be available in three versions including a ready-to-run with radio installed.

* * *

TRI-STAR Imports, the people who brought us the Nichimo Exceed and the innovative front-wheel-drive Spirit FF, will be adding two new cars to the line, the Star-

Shooter (2WD) and the Luminous (4WD). Both feature four coil-over, oil-filled shocks, quick-change motor and pinion, B.E.C. and adjustable camber.

* * *

MY MOST reliable informant has told me that Gorham Model Products of Calabasa, CA, the people who have years of precision helicopter manufacturing under their belt, are introducing a new line of Hirobo cars, cars never seen by the public eye. All I can tell you at this time is, with John Gorham's reputation for high quality in his helicopters, the tradition will most likely be carried over in the new car line.

* * *

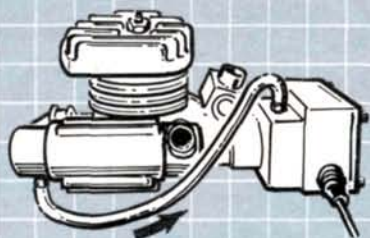
THE NAME Mugen is not new to us, but the name Manx is. That's because the Mugen Manx is Varicom's all-new 2WD car that comes tricked-out from the factory with many YOU-G features a gold-plated rims, blue-anodized sideguards, coil-over oil-filled shocks, and heavy-duty double-wishbone front end. Watch for a no-nonsense track report next month.

* * *

(Keeping my ear to the ground and my eye to the spyglass.) See you next month!

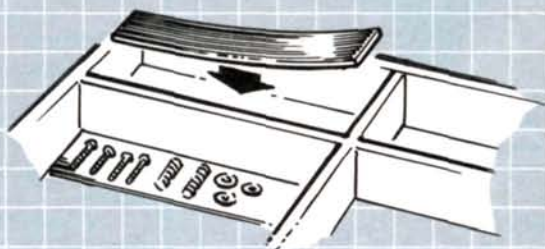
Pit Tips

by JIM NEWMAN



This simplified sketch shows how it is possible to screw a pressure fitting into the muffler and the power input side of the transmission. The silicon rubber tube conveys exhaust oil mist to the gearbox to continually lubricate the gears. An additional benefit is that the gearbox is lightly pressurized, which will discourage entry of dirt and water.

Alan Hogenson, Minneapolis, Minnesota



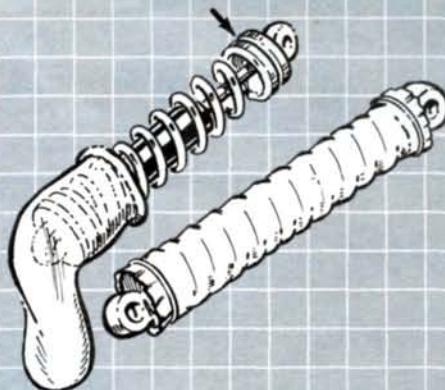
This car owner finds the chaos in his compartmentalized tool kit to be totally unacceptable, so he placed strips of self-adhesive magnet in the bottom of each compartment. Now the screws, etc., stay put and don't need sorting through.

Dennis Rike, N.A.S. Cecil Field, Florida



Motoring around a wet track, this open frame car collected a lot of extra weight as mud packed in the nerf bars (arrowed). As a cure, Steve used metal from pop cans to wrap over the bars, filling the space and securing it with four small screws.

Steve Hardy, Tyler, Texas



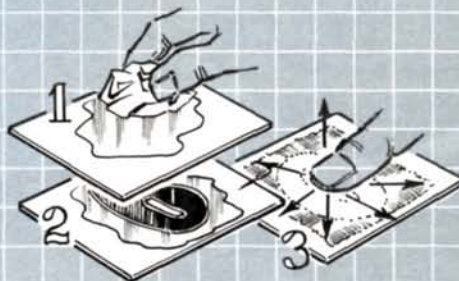
Nothing destroys shocks faster than mud and grit getting past the seals, so here is a good defence. Pull a 1/2-inch diameter balloon over the shock and tie each end with cord or use those small dental rubber bands. On some shocks it is possible to file a groove around the ends to retain the bands or thread. See arrow.

Ed De Neve, Oneida, New York



Our contributor cutely advises us that he does not always keep his car "shiny side up" and as a result he kinked the plastic tube which contains the antenna. To provide greater support for the base of the tubing, interlace two ball-point pen springs and force them down over the tube to the base where presumably they are captured with a dab of tub seal.

Monty Norin, Moline, Illinois



This method of applying decals allows easy positioning and eliminates bubbles. Swab the area with a generous application of detergent/water mix and do not dry it off. Immediately float the decal in place, then lay a piece of paper towel over it. Hold the towel in place while squeegeeing the detergent and air out from under the decal. Always work from the center outward as shown by the arrows, then blot up the water with a dry tissue.

Kevin Kopczynski, N. Tonawanda, New York

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o Radio Control Car Action, 632 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

Futaba

MAGNUM SPORT

by CHARLIE KENNEY

THIS MONTH I'll review a very fine radio set especially designed for cars, the new Futaba* Magnum Sport. This new system will probably exceed the Magnum Junior as the most popular of Futaba's car radios. The system as it arrived operated on Channel 64 (75.470 MHz) and consisted of a pistol-grip transmitter FP-T2P, a two-channel receiver FP-R2GS, two servos FP-S28, integral switch harness and battery holder, and the following accessories: frequency flag, spare servo horns, and servo-mounting hardware. Quite a complete package. Please note that both transmitter and receiver are powered by dry batteries, although Ni-Cds could be used with a separate charging system. Let's take a look at some of the system's features.

Transmitter—FP-T2P

- Human-engineered size and design are easy to use.
- Wheel angle adjuster. The turning angle of the steering wheel can be increased and decreased. This allows operation at the best angle.
- Neutral adjuster. The throttle trigger throttle stroke/brake deflection stroke (back stroke) can be freely selected to match the application.
- Servo-reversing switch (steering and throttle) is standard. Each servo can be reversed from the outside, which is extremely convenient when connecting the linkages.
- Since a level meter is provided, battery consumption can be seen at a glance.

Receiver—FP-R2GS

- Small, lightweight, rugged, and high-performance AM 2-channel receiver.
- New subminiature, highly reliable pins used at the crystal socket also increase reliability. The crystal can be changed

from the outside of the receiver.

- Thick film gold-plated connector pins eliminate poor contact and improve reliability against shock and vibration.

Servo—FP-S28

- Motor uses the newest helical-type rotor for improved output torque and smooth operation.
- These heavy-duty and water/dust tight servos are designed for use with Futaba digital proportional radio-control sets.

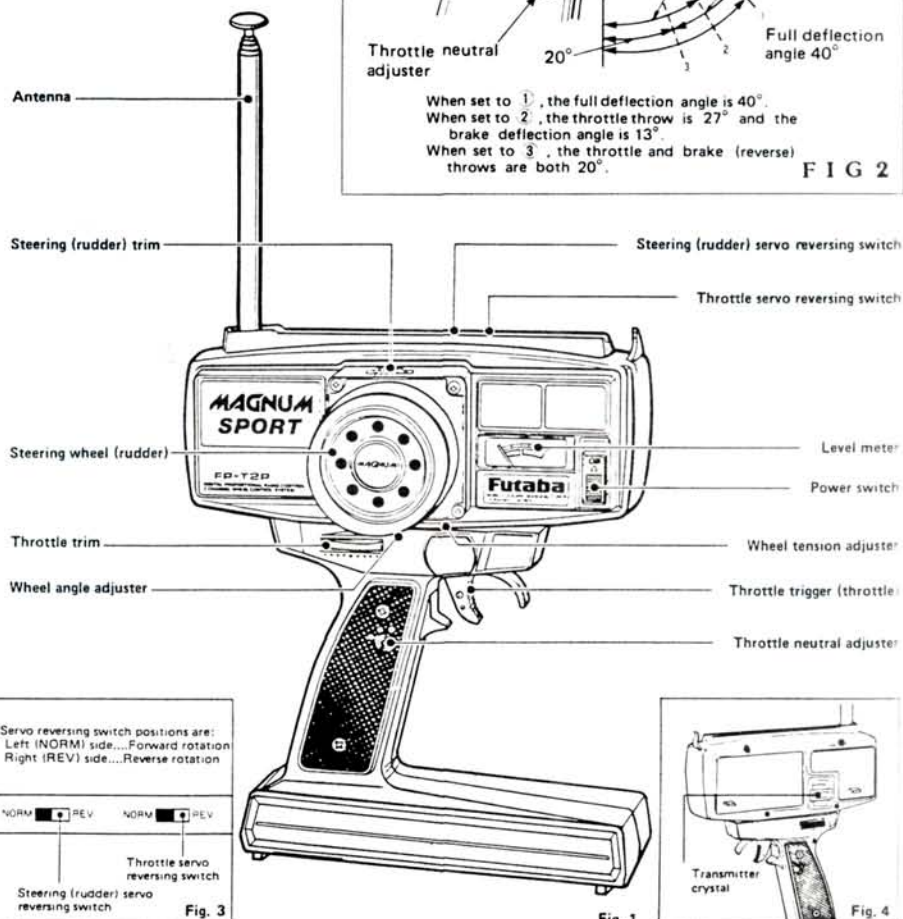
- New indirect driver potentiometer improves vibration and shock resistance and increases neutral precision tremendously.
- Futaba low-power custom IC provides high starting torque, narrow dead band, and excellent trackability.
- Fiberglass-reinforced PBT (polybutylene terephthalate) injection-molded servo case is mechanically strong and invulnerable against glow fuel.
- Strong polyacetal resin ultra-precision servo gear features smooth operation,





photos by SUE KENNEY

Business end of transmitter RF section to right.
Encoder to left. Note channel 64 crystal.



TRANSMITTER—FP-T2P

- **Operating system:** Pistol-grip type, two channels
- **Transmitting frequency:** 75 MHz or 27 MHz band
- **Modulation:** AM (amplitude modulation)
- **Power requirement:** 12V eight AA dry batteries
- **Current drain:** 200 mA
- **Dimensions:** 8 1/4 x 7 3/4 x 3 3/4 inches
- **Weight:** 1 pound, 8 ounces

RECEIVER—FP-R2GS

- **Miniature 2-channel AM receiver**
- **Receiving frequency:** 75 MHz or 27 MHz band
- **Intermediate frequency:** 455 kHz
- **Power requirement:** 6V four AA dry batteries
- **Current drain:** 10 mA
- **Dimensions:** 1 1/2 x 2 1/8 x 3 3/4 inches
- **Weight:** 1.34 ounces
- **Receiving range:** 1,500 feet on the ground



Vehicle system receiver, battery box
and switch, plus two servos.

SERVO—FP-S28

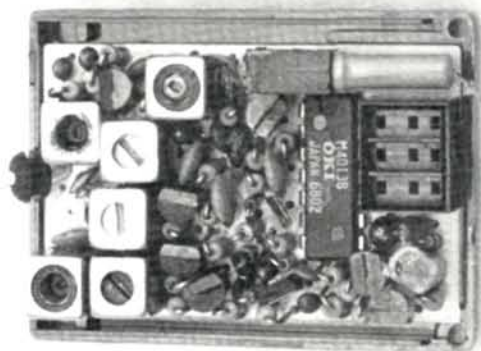
- **Control system:** Positive pulse width control, 1.31 MS neutral
- **Operating angle:** Rotary system, one side 45°
- **Power requirement:** 6.0V shared with receiver
- **Current drain:** 8 mA (at idle)
- **Output torque:** 48 inch-ounces
- **Operating speed:** 0.24 sec./60°
- **Dimensions:** 1 5/8 x 1 5/16 x 1 5/8 inches
- **Weight:** 1.86 ounces

positive neutral, and very little backlash.

- Fiberglass-reinforced epoxy resin PC board with through-hole plating improves servo amp vibration and shock resistance.
- Thick film gold-plated connector pins eliminate poor contact and improve reliability against shock and vibration.
- Special grommet bushing simplifies servo mounting and improves the cushioning effect.
- Six special adjustable splined horns are available.
- Maximum output torque of 48.7 inch-ounces allows use in almost any model.
- Good operating speed of 0.24 sec./60°.

The Futaba FP-T2P's most unique feature is the pistol-grip transmitter. The car radio unit is quite conventional with a receiver, switch harness with integral battery pack and two servos. It's really no different than what you might use in a model plane or boat, so I would like to spend most of this review on the transmitter and its controls.

The most obvious place to start is with the wheel and the trigger throttle (see Figure 1). The wheel is spring-centered and can be deflected left or right by twisting. Incidentally, it is presumed that the servo-reversing switches are in the normal position for all of the following descriptions. The throttle trigger is moved by squeezing the trigger. The throttle neutral position can be set to any one of three positions by turning the throttle neutral adjuster with a dime or small-blade screw driver (see Figure 2). The throttle neutral adjuster control is located



Two-channel receiver is very compact. See text.

on the pistol grip just to the left of the bottom of the trigger. The slot in the adjuster identifies the position. Position 1 is full counterclockwise. Positions 2 and 3 are positioned by moving the control clockwise to position 2, and then 3. Each position is detented (click). Position 1 has a full trigger deflection angle of 40°, when set to position 2, throttle is 27° and brake deflection is 13°, when set to 3, the throttle and brake throws are both 20° (see Figure 2). It is recommended that

position 2 be used for engine-powered cars. Position 3 is usually used for electric power.

Moving to the right of the steering wheel is the Level Meter. When the transmitter is on, the pointer should deflect to the silver zone. If it falls in the red zone, a charge (if you have Ni-Cds) or battery change is required. To the right of the Level Meter is the power On/Off switch, up is On. Rounding out the transmitter top is a telescoping antenna which measures 40 inches long when extended and is made up of nine telescoping sections. The antenna must be screwed into the transmitter before operating. The servo-reversing switches are located under the antenna in its stored position. The steering switch is to the left, throttle to the right. Left position is normal, right position is reverse.

Two other controls which are not readily apparent are the Wheel Angle Adjuster and the Wheel Tension Adjuster. These can be seen by tipping the transmitter forward and looking

(Continued on page 66)



Top view shows servo-reverse switches in antenna trough.

Tire Balancing

by the RADIO CONTROL CAR ACTION STAFF

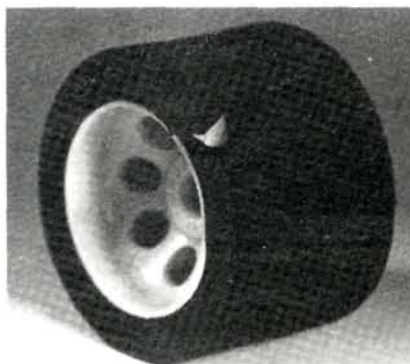
WHY SHOULD you take the time to balance your foam rubber tires? Because unbalanced tires can cause your car to handle poorly and lose speed. A severely unbalanced tire can also cause excessive vibration and wear on your entire car.

The first thing you should do is look at your tires closely. Sometimes you can find out if a tire is going to be out of balance just by looking at it. At times you'll find a tire with uneven sidewalls. When the tires were trued, somebody overlooked the sidewalls and left a bulge in them. Don't try to balance this tire until after you've ground the bulge off.

Another problem you can spot is when the tire's out of round. Part of the tire will have a greater distance from tire tread to rim than the opposite side of the tire. In most cases this will be a tire to discard. The only exception would be if you can grind the tire back to round and still have enough wear left in the tire to make your grinding worthwhile.

A third thing you can find upon inspection, and this is especially true of used tires, is when there is a chunk of rubber missing. Once again, trash the tire rather than balance it.

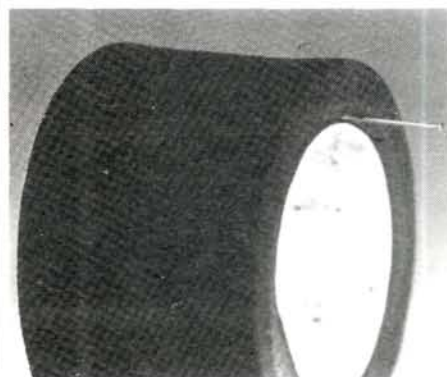
As for the balancing itself, it can be



When your tires have a chunk of rubber missing, like this, don't waste time with balancing, get a new set of tires.

easy to do. Mount the tire/wheel (with bearing, if a front wheel) on a metal shaft. If you're doing a rear wheel, mount it on a hub you've already balanced. Have the shaft suspended between two level metal surfaces. Give the tire a good spin with your finger. When it comes to a stop, make a small mark on the tire or rim to show which spot stopped in the bottom position. Now give the tire another spin. Find out if the tire is stopping at the same place consistently. If it does, it means there's a heavy spot in your tire. To compensate for this weight, add either pins or small finishing nails to the high side of the tire, opposite the low spot the tire stopped on. Push the pins in from the inside of the tire, as close to the rim as

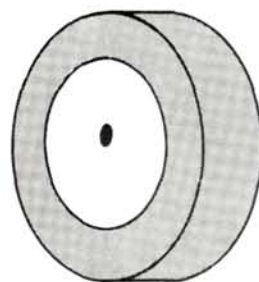
possible and parallel to the rim. Now check the tire by spinning it again. If the tire stops in the same spot, add another pin or nail right next to the first one. Eventually, you'll get the tire so that it won't stop at any one place consistently.



This is how the pins should be put in the light side of the tire.

The last thing to do is go back and glue the pins in place. Just a small dot of Pacer's* CA+ Zap A Gap on the head of each pin will do the job.

If you want to balance your tires in style, you can use a High Point* Balancer.



TIRES OUT-OF-ROUND

This is a quality machine that gives the most accurate balancing possible.

Take the time to balance the tires before you race, and it'll be a *smooth* ride.

**The following are the addresses of the companies mentioned in this article:*

Pacer Tech, 1600 Dell Avenue, Campbell, CA 95008.

High Point Products, 3013 Mary Kay Lane, Glenview, IL 60025. ■



photo courtesy of MRC/TAMIYA

Track Report

by CHRIS CHIANELLI

EVERY time I turn around new products are being released at an amazing rate. Sometimes

Monogram **TORNADO**

*Monogram ups
the ante with
this 1/10 dirt
scorcher!*



it makes me feel like a hungry dog surrounded by a dozen bones. I'm certainly not complaining, I love it as I'm sure you do, but naturally all the input concerning new products can get quite confusing and at times even frustrating. Being the associate editor of *Radio Control Car Action*, it's quite refreshing for me to bring to light an offering that gives a different slant at a good price, while also having a broad-based potential as the user's proficiency increases. I feel the 1/10-scale Tornado from Monogram Models* falls into this category.

Let me explain. The Tornado is a shaft-driven four-wheel-drive car with upper and lower A-arm independent suspension

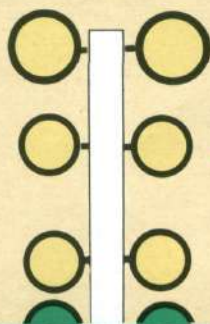
on all fours and two interplanetary gear-type differentials. This sounds like some basics for a rather competitive car, and they are. There's just one thing I forgot to mention, the Tornado comes with everything needed to run the car and it is fully assembled! Now it sounds like

(Continued on page 66)



Funny Car

by R/C CAR ACTION STAFF



was no need for repainting.

ASSEMBLY. Everything is laid out efficiently, and by following the instructions, step by step, the car is ready to go in about four hours. I did, however, place a call to Pacesetter's Technical Support Hot Line and received a lot of helpful information on parts. I was surprised to discover, during this conversation, the secret to the Funny Car's scale-likeness: J. E. Fiberglass of Los Angeles, makers of the full-scale funny car body for Don "The Snake"

Serve up some smoke burnouts with this drag machine.

BECAUSE enthusiasm was declining in 1/10-scale electric events, I wanted a remote-control car with more power and scale features. While speaking to a salesman at the local hobby shop and looking over some of the 1/4-scalers on display there, the Pacesetter* alcohol-burning '87 Corvette Funny Car, the Eliminator, sat shining and still as a pin.

This new scale of cars is awesome: the sleek 50-inch Vette body able to knife at speeds of more than 100 mph.

THE KIT. When I got the car home I was delighted to find a detailed instruction booklet and all the tools I needed to assemble the car. There were hex wrenches, Loctite, and even a "Helpful Hints" section in the instruction booklet. The car came with a painted frame, which saved hours of sanding and painting. The Corvette body arrived in just the color ordered, so there



The sleek 50-inch Eliminator is a perfect example of beauty in aerodynamic form. Parachute really works.

Purdhome, and Chute Metal Corp., makers of the full-scale parachute for Darrell Gwynn, also make the Eliminator's components. Many of the Eliminator's parts in fact—frame, body, parachutes, and headers—are manufactured by those companies that supply the original, full-scale components.

PERFORMANCE. The engine fired up with no trouble using the break-in oil included in the kit, and alcohol. The Eliminator really roars with its powerful 2.3-horsepower, two-stroke Quadra engine; and with the optional headers, it doesn't take much imagination to put you in the midst of a full-scale event! There's even an optional parachute to complete the Eliminator's scale look.

After hearing its fury, a friend and I took the Eliminator down to a parking lot that was perfect—it

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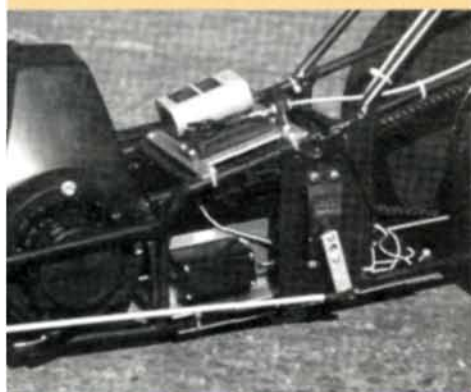


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had at least 600 feet of straight run. I positioned my car at the beginning of a 1/4-mile stretch (335 feet is the official track length set by IRROQ) with my friend at the end of the run with a stopwatch in hand. A small crowd gathered to see the car in action. The engine was tuned, the battery charged, and the parachute



The 2.3-hp Quadra coupled with optional headers is partly responsible for 100-mph-plus speeds of Vette Eliminator.

was packed and tested. Upon starting, the engine smoothed the tires, warming and honing them against the pavement, peaking both the crowd's excitement and my own. Without notice I flung the throttle wide open and the crowd cheered as the engine screamed to 12,000 rpm and the tires bellowed smoke along the stretch of tar. Excitement overflowing, the car roared toward the finish and I prepared to open the chute on the timer's cue that the car had reached the 1/4-mile mark.

The Eliminator peacocked, its chute full blown and tugging, as the crowd cheered the show—a perfect 4.8-second run. The combination of chute and dual disc brakes had safely brought the furious contender to a halt.

Pacesetter, true to their name, has yet another offering, a Formula I, that's just about ready for shipment to your local hobby shop.

**The following is the address of the company mentioned in this article:*

Pacesetter Products, 930 W. Hyde Park Blvd., Inglewood, CA 90302. ■

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The Starting Line

by the RADIO CONTROL CAR ACTION STAFF

This question/answer format is designed for beginners and will attempt to answer questions, correct misconceptions, and generally ease entry into the rapidly growing hobby/sport of R/C cars. We welcome your questions, as answers to representative questions will help other beginners. Direct your questions to "The Starting Line," *Radio Control Car Action*, 632 Danbury Rd., Wilton, CT 06897.

Let's go over some of the things you should consider when buying an R/C car kit. We've done this before, but we can see by the letters coming in that many answers weren't understood the first time and we are only too happy to go over the subject again.

Q.

Should I worry about the size (physical dimensions) of a car?

A.

The only time you should really get involved with the actual size measurements is if you're considering a special project or intending to race and must meet a definite size limitation.

Q.

Is there a general way to determine size?

A.

Yes. The common way is to label the scale size of the car: $\frac{1}{10}$ -scale cars tend to be about 14 to 16 inches long. $\frac{1}{12}$ -scale cars are about 9 to 11 inches long. The fraction means the model is 10 or 12 times smaller than a full-size car, if it really existed.

Q.

What is the difference in motor size for electric cars?

A.

The size designations change from one manufacturer to another. Mabuchi motors go from small to large numbers; hence the RS-380 motor is smaller than the RS-540 motor. LeMans, Yokomo, and other brands carry different size designations as well as power variations within the same physical size.

Q.

What do you mean by power variations?

A.

Even if two electric motors have the same physical size, they can be built for more speed, more torque, or longer running time. Each motor manufacturer has different models to meet different needs for buggies or road racers.

Q.

Should I care about whether the car has two-wheel drive (2WD) or four-wheel drive (4WD)?

A.

Yes, for several different reasons. First, 2WD cars are generally more economical to buy, easier to assemble, and simpler to maintain. Second, 4WD cars might have better handling, but that means higher speeds for a beginner who might not know how to handle it. Third, if you intend to race, there are separate categories for 2WD and 4WD cars with varying skill levels to compete against.

Q.

What about size difference in gas cars?

A.

This is a lot easier to explain. Gas cars have engines designated by cubic inches. A .21 engine is approximately twice the cubic size of a .09 engine. The car kit using a .09 engine would be more economical to buy than a .21 cubic inch powered car, but the .21 engine cars are noted to be faster. There are 2WD and 4WD gas cars, too.

Q.

What is four-wheel-drive steering (FWDS)?

A.

As you are aware, most cars use only the front set of wheels for steering. On certain 4WD cars, such as the Mugen Bulldog II, the front and rear wheels are coupled together for steering simultaneously. When properly adjusted, the car has a slight handling advantage because it is steering and transferring power to the wheels in the same direction.

Q.

Are oil-filled or air shocks absolutely necessary?

A.

No, fancy shocks are not needed for beginners. They are necessary once you learn to drive the car very aggressively over rough terrain. Many kit manufacturers allow you to upgrade a car to shocks that was not so previously equipped.

Q.

What is battery eliminator circuitry?

A.

Basically speaking, an R/C system needs batteries to power the transmitter and the receiver mounted in a car. The receiver battery takes up space and adds weight to the car. Battery eliminator circuitry powers the receiver and servos from the same battery powering the electric motor. Right now Tamiya makes several BECs for the most popular brands and several R/C manufacturers make their own BEC; some of the biggest R/C companies have miniaturized the BEC and put it inside the receiver to save more space inside the cars.

Q.

What happens when the motor battery gets weak in a BEC-equipped car?

A.

The R/C car could go out of control if you let the motor battery get too weak in a BEC-type car. However, you do get a few warning signs before that happens: the car runs slower, the servos move slower, the range of control might decrease, and you might suffer a momentary loss of control (a glitch). When this happens, stop running the car. By the way, this holds true if you're using a receiver battery in your car instead of a BEC. For more information on BEC, see Mike Lee's article elsewhere in this issue.

Q.

What's the difference between an injection-molded plastic body and a polycarbonate (Lexan) body?

A.

An injection-molded plastic body usually has more scale detail. In other words, it looks more like the real thing. A polycarbonate body, due to the nature of the material and how it is cast, cannot be molded with accurate scale detail. However, the polycarbonate body is much lighter in weight and is considered to be more rugged in race situations. Either type of body can be modified to suit your purposes.

Q.

Should I choose a track car or an off-road buggy?

A.

That depends on what you like and where you live. One thing to keep in mind is that if you don't have a road track or a really smooth place to run a track car, a buggy is a sensible choice. Road track cars are built so low to the ground that a pebble can send the car flying! Perhaps that is the reason for the overwhelming popularity of buggies; they can go almost anywhere!

Q.

About track cars; are there different styles?

A.

You bet! We've got sports cars of different classes: Grand National stockers, Formula I racers, Indy cars, and even drag racers.

Q.

Can I use my off-road buggy on the street?

A.

If you mean using your buggy on a track of some sort, that's okay to a certain extent. The problems are that the tires meant for dirt or sand will wear very quickly on an asphalt or other type of road surface. Also, you won't be able to take corners too fast because the off-road tires will "grab" and flip the car. Also off-road cars have a higher center of gravity due to the higher ground clearance necessary. *But regardless, don't use your car in a street! It isn't safe for your R/C car, yourself, or for drivers of full-size cars using the street!*

Q.

If I wanted to convert my buggy to road use, what kind of tires should I get?

A.

Sponge tires would be preferable. If the car manufacturer doesn't make a set, there are plenty of parts manufacturers who do.

Q.

Are there cars that are suitable for road or off-road use "out of the box"?

A.

Not too many. Such cars tend to be modeled after "rally" cars that have to race over roads of varying quality around the world. One example of this is the MRC/Tamiya Porsche 959, with knobby tires that are a compromise between off-road grip and on-road handling. By the way, it is unusual in that it is a 1/12-scale car with 4WD and working headlights! Nighttime racing, anyone?

Q.

Should I choose a car based upon its suspension?

A.

For beginners, we feel it isn't as important as the fact that it *does* have a suspension, especially one that lends itself to improvements. That factor is one of the differences between a "toy" R/C car and our "hobby" cars. Four-wheel independent suspension is regarded as the best way to go. However, cars with a rear rigid swing axle, such as the Monogram Lightning and the MRC/Tamiya Grasshopper and Hornet, have also enjoyed great success.

Q.

How can I improve a car's suspension?

A.

One of the best ways is to add shock absorbers to a car that doesn't have them. If it has shock absorbers, using a setting for a softer ride means less shock is transmitted to the chassis. If that's not possible, buying shocks with a greater "volume" can do the job. Anti-sway (stabilizer) bars help a great deal too.

Q.

Why are there different types of tire compounds for road cars?

A.

It's just like full-size racing; no two race tracks can be handled the same way and track conditions can change with weather and usage. There are tires for indoor racing, outdoor racing, for tracks with lots of rubber deposits on them, for oily tracks, and for different temperatures.

Q.

Can you give me the names of all the manufacturers of R/C cars and parts?

A.

Gulp! That's a tall order. However, the most important ones can usually be found in the articles and advertisements in this magazine, we're proud to say. When you write or call them, do two things; one, be sure you ask them about *their* product, not someone else's (it's embarrassing and wasteful of everyone's time), and two, tell them exactly what issue of the magazine you saw their product in. That information helps them, you, and us! ■

Cruisin'



Parma's '33 Ford street-rod body on MRC/Tamiya Fox undercarriage. Advance Grand Prix wheels on Advance mags.

by FRED MURPHY

REMEMBER the Everly Brothers, the Belmonts, the Chiffons, and cruisin' the streets with the Beach Boys? Whether you remember or not is not important, but we've all seen those sharp machines that were such a great part of the '50s and '60s, an era when cruisin' was the only thing to do on a Saturday night. Well, thanks to the people at Parma International*, those years can once again become a reality. You can turn any 1/10-scale machine into a cruisin' machine of yesteryear.

In 1933 the Ford Motor Company introduced a two-door coupe that as of late has been reborn through the popularity of the rock group ZZ-Top (cover shot). This rock group's chopped version of the '33 coupe is an excellent example of a cruisin' machine. Parma has taken this popular body style and reproduced a 1/10-scale



More Neat 1/10 Hot Rod Ideas!

Lexan body that allows the rubber to burn once again—legally this time, I might add. The sky's the limit, only your imagination can stop you now.

Along with Parma's '33 chopped coupe body, all you'll need is a universal mounting kit, part No. 10450 for the Grasshopper, Hornet, Hotshot, Wild One, Optima, Bulldog, or RC10, part No. 10451 for the Frog, or part No. 10452 for the Fox. These body-mounting kits will make the conversion a pleasant experience. By the

way, Parma's mounting kits will enable you to mount just about any body you can find, not just street rods.

As we all know, the thing that makes heads turn for any sharp machine is what is on the outside, not what's under the hood, and nine times out of ten you never get to see what's under the hood anyhow. So let's take our time and use as much imagination as we can muster to dress this street rod to kill. Yes, it's important to have a smooth-running machine under the



Another Parma '33 Ford on Hirobo chassis done up like the famous ZZ-Top car. Now all we need is Peggy Sue.

body but I'm sure we'll be going by those turning heads so fast, looking so fine, we'll want to make sure those heads stay turned.

Don't use the basic colors available for Lexan bodies, give this street rod some extra flare, such as a nice metallic finish or even that impossible-looking flame job you've always admired. With a little practice and the right material the expert paint job can be yours. A good source for this basic know-how is in "Painting Lexan Bodies" in the Spring 1986 issue of *Radio Control Car Action*.

After you have the body ready for show, the next area of concern is the rubber and wheels to add those finishing touches that are so important for a hot street rod. For this we went to Advance Engineering* for a super fine assortment of wheels and tires. Mini-Mags by Advance are of aircraft-quality aluminum and can be

mounted on any car with the use of wheel adapters also from Advance. As for the selection of rubber to put on these fine wheels, MRC-Grand Prix tires from England are again available from Advance Engineering. They have radial-type tread designs along with those all-important racing slicks and low-profile slicks. These tires are molded rubber with a molded fabric body for use on wet or dry paved and dirt tracks. Not only do they have the styles for the awesome street rod look, but you can even have the added benefit of choosing from five different rubber compounds if you need that extra edge when running on Saturday nights for pink slips.

So let's shine them up, show them off, and go cruisin'. The days of drive-ins, soda fountain shops, girls in

poodle skirts and bobby socks, and the finely-laid-back look can be a lot of fun. Just remember the Fonz is not the only cool guy on the street. Lay down some rubber and I promise you'll turn heads.

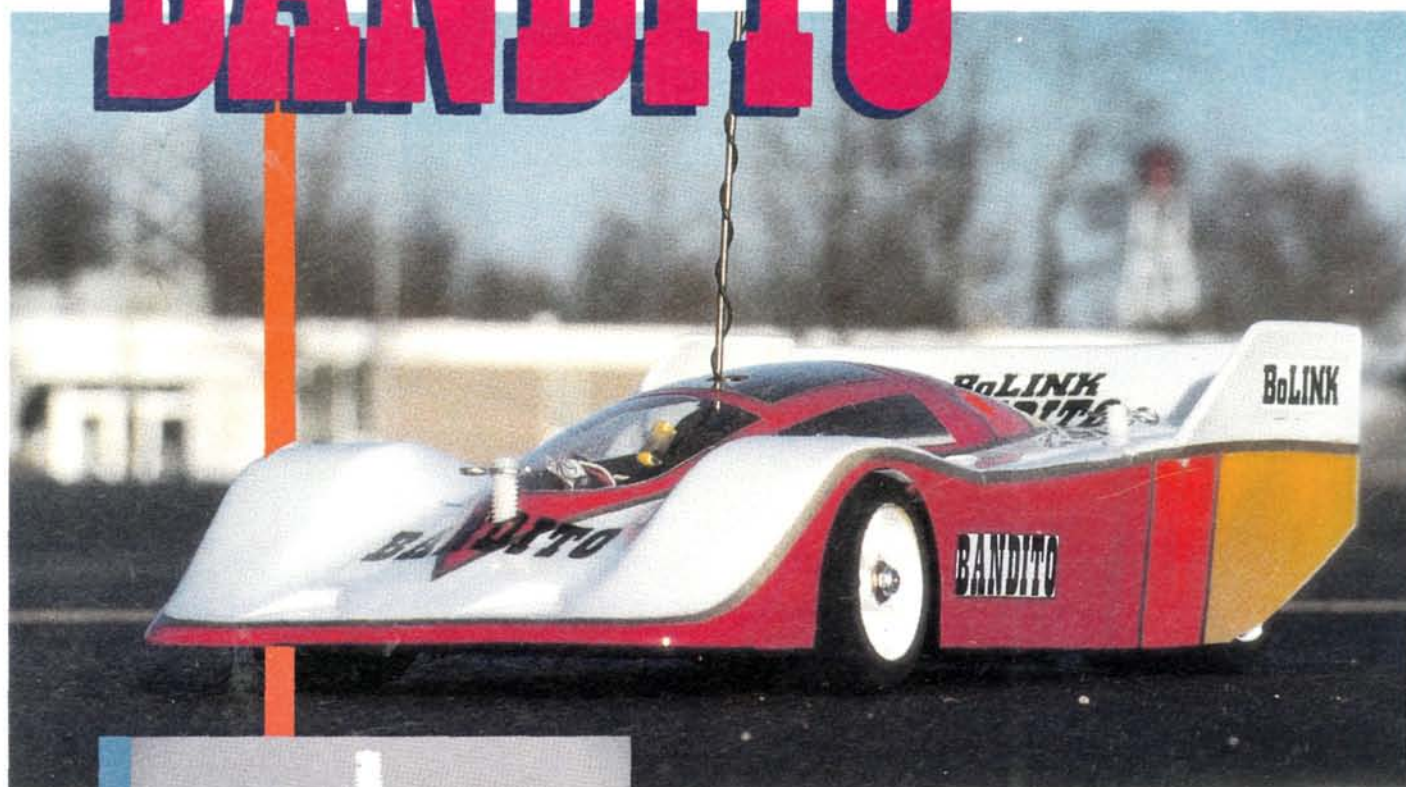
**The following are the addresses of the companies mentioned in this article.*

Parma International, 13927 Progress Pky., N. Royalton, OH 44133.

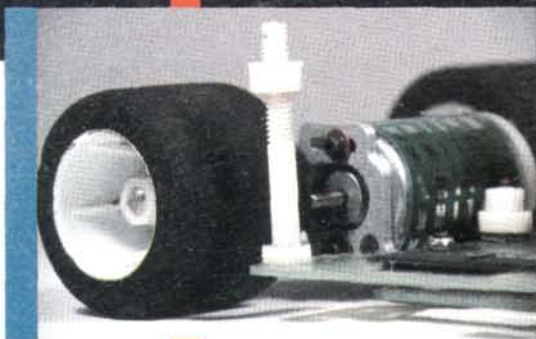
Advance Engineering & Mfg. Co., 180 S. Hwy. 67, Unit G, P.O. Box 766, Woodland Park, CO 80866. ■

BANDITO

BoLink



BoLink's body posts are light and easy to adjust.



BoLink provides a handy system for mounting the resistor.



A-arms provide independent front suspension.



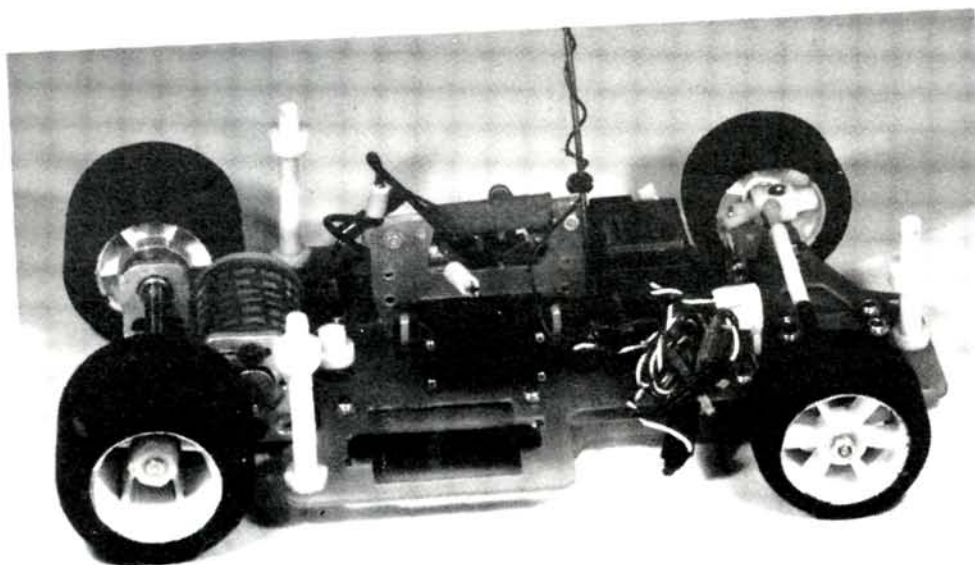
by the RADIO CONTROL CAR ACTION STAFF

BOLINK R/C Cars* of Georgia hopes to bushwack the competition with the Bandito. A 1/12-scale road racer, the Bandito is available in either a 6-cell version or the 4-cell that I tested. BoLink believes their cars should be competitive and easy to maintain; the Bandito is both.

THE KIT. The Bandito features an independent A-arm front suspension system. There are separate coil springs, but a monoshock dampener ties the two A-arms together. BoLink uses a raised radio tray on the green fiberglass chassis. The lower portion of the chassis has a large T cut out for the rear suspension. The aluminum one-piece motor pod is lightweight. Batteries, motor and differential are all included in the kit. I chose a Futaba* Magnum Junior radio with two S-32 servos and a FP-R2H lightweight receiver. A clear Schkee body is included in the kit.

CONSTRUCTION. The Bandito goes

Bushwhack the competition with this 1/12 asphalt burner!



Bandito sans body shows well-thought-out and compact design. Chassis and raised radio compartment are of fiberglass.

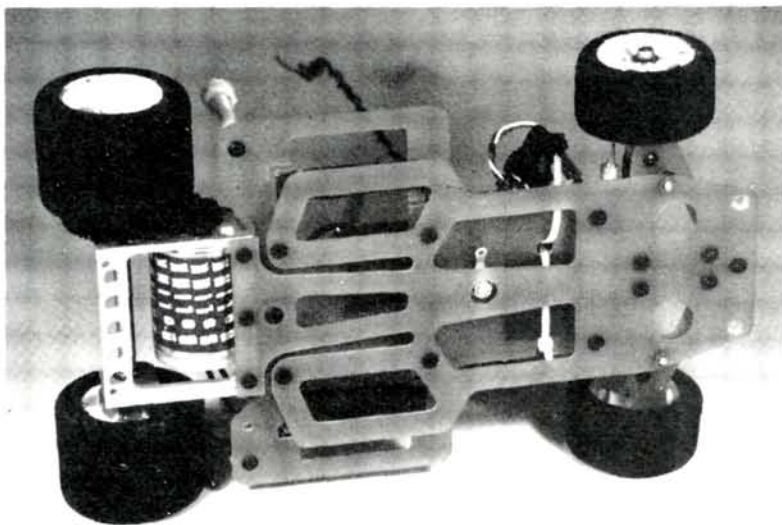
together very easily.

The four-page instruction sheet has two full pages of drawings. When the A-arms are installed, you must be sure they move freely, or the front suspension won't work properly.

I installed the new threaded stub axles instead of the standard axles. When using the threaded axles, be careful not to make the locking nuts too tight or you'll cause the front wheels to bind.

Instead of using the standard front springs, I installed a softer set of Delta* springs. The stock springs were too stiff for the 4-cell setup. The resistor bracket was easy to mount on the S-32 servo. This system maintains proper alignment between the wiper arm and the resistor.

You wouldn't want to use servos any larger than the Futaba S-32; there isn't a lot of room to mount the radio equipment. Be sure to put a flat spot on the roll-over antenna for the setscrew to tighten against, or it'll come out of the car.



Rear suspension is born from cuts in the lower chassis plate.

PERFORMANCE.

The Bandito handles very well. Understeer was a problem at first, but I corrected that by making the front springs a little softer. Now the car can cut to the inside of the tight turns. The rear suspension provides plenty of traction. The stock tires worked well on carpeting. The stock motor runs for 8 minutes with no problem. It has plenty of power for the stock motor class.

BoLink has built a sturdy, straightforward racer. The Bandito doesn't require a lot of adjustments to get it to run well—it's ready for a 1/12-scale shootout.

**The following are the addresses of the companies mentioned in this article:*

BoLink R/C Cars, 420 Hosea Rd., Lawrenceville, GA 30245-4695.
Futaba Corporation of America, 555 W. Victoria St., Compton, CA 90220.
Delta Manufacturing, 27 Race Car Court, Lorimor, IA 50149. ■

Engine Review

by PETER CHINN

SPECIFICATIONS

Type: Air-cooled, single-cylinder, side-exhaust, two-stroke cycle, with crankshaft rotary-valve and Schnuerle-scavenging.

Bore: 16.6 mm (0.6535 in.)

Stroke: 16.0 mm (0.6299 in.)

Displacement: 3.463cc (0.2113 cu in.)

Nominal Compression Ratio (full-stroke): 9:1

Speed Control: Super-Tigre Mag type automatic mixture control carburetor.

Checked Weight: 296 grams (10.4 oz) including air cleaner, less muffler.

Mounting Dimensions:

Crankcase width: 28.0 mm

Length from prop driver face: 83.5 mm

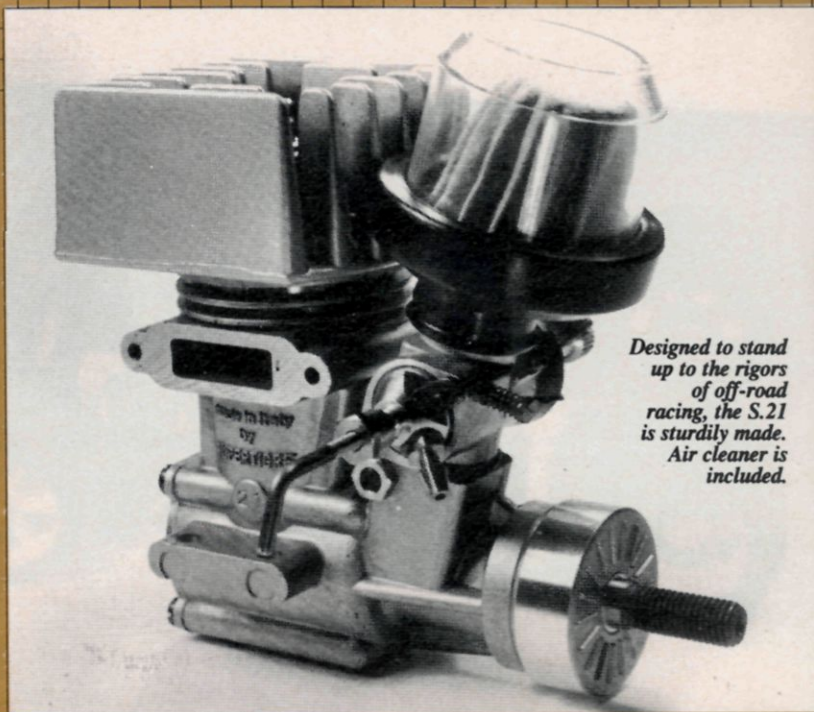
Height above CL: 70.5 mm

Bolt-hole spacing: 38x15 mm

Manufacturer's Claimed Power Output: 0.9 bhp at 22,000 rpm.

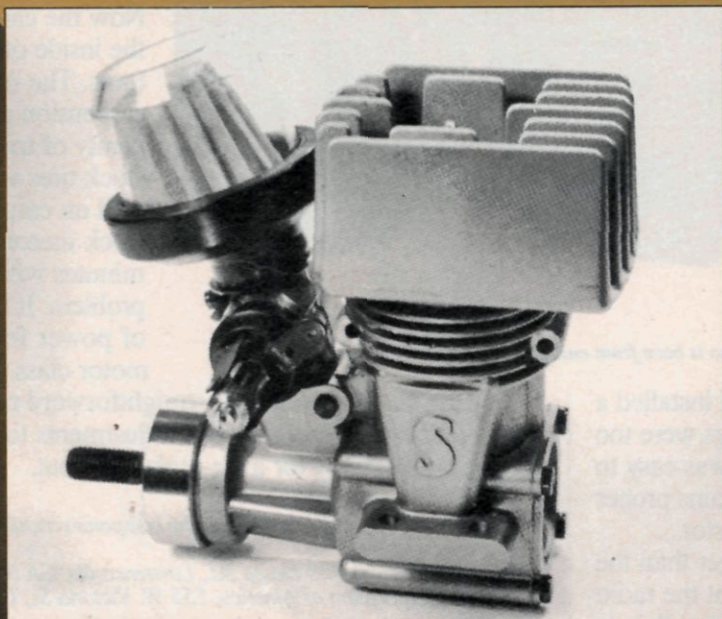
Manufacturer: Super-Tigre s.r.l., 40065 Pianoro, Bologna, Italy.

U.S. Distributor: Great Planes Model Distributors Company, P.O. Box 4021, 1608 Interstate Drive, Champaign, IL 61820.



Designed to stand up to the rigors of off-road racing, the S.21 is sturdily made. Air cleaner is included.

Super-Tigre S.21 "Buggy"



Large "heat-sink" type cylinder head has deep tapered fins for effective cooling. Air cleaner has semi-enclosed paper element.

THIS OFF-ROAD car engine, from the Italian Super-Tigre factory, is closely related to the S.21 Buggy-RS model featured in this series a few months ago. The main difference between the two engines is that the model described here does not have provision for starting the engine from the back.

Readers who studied the illustrated write-up of the RS model will recall that, in place of the standard crankcase backplate, it has a special rear housing containing two ball bearings that support a rear shaft coupled to the crankpin. The outer end of the shaft is equipped with a 30 mm diameter aluminum alloy cone to which a conventional electric model engine starter can be applied.

Not every model car enthusiast needs this refinement, nor will every car chassis accommodate it and, to meet such requirements, the factory is offering the

Italian Thoroughbred!

standard S.21 Buggy model seen here. Obviously, the rear-start facility is an excellent idea. On the other hand, the standard engine is cheaper, lighter, slightly more compact and, incidentally, has a higher nominal power rating: 0.9 bhp at 22,000 rpm, instead of 0.8 bhp at 22,000, according to the manufacturer's literature.

The notes that follow will mostly deal with parts that are common to both this and the RS model, but which were omitted from our earlier description in favor of emphasis on the special features of the RS. The two descriptions may, therefore, be read in conjunction with one another, if the reader wishes to seek more information on any particular point.

As is to be expected, the two S.21 car type engines both use the same main casting. Actually, there are, at present, seven Super-Tigre motors that use this same casting. For the record they are designated as follows: S.21SL ABC R/C (aircraft version); S.25 ABC R/C (same as S.21SL ABC R/C but with cylinder bore increased to 18 mm to enlarge displacement to 4.07cc or 0.248 cu in.); S.29-Ring R/C (bore and stroke increased to 19x17 mm—see *Model Airplane News*, sister publication of *Radio Control Car*



Parts, clockwise from cylinder head, include chromed bore cylinder-liner, ringless aluminum piston and rod assembly, crankshaft with tapered collet and driver.

Action, "Engine Review" December 1984 for full test report); S.21 Buggy; S.21 Buggy SG (with special crankshaft for "SG" cars); S.21SL Buggy RS, and S.25SL Buggy RS. This ubiquitous casting embodies the crankcase, front housing, and complete cylinder casing.

Cylinder porting is Super-Tigre's "TST" variant of the Schnuerle-plus-third port scavenging system and a check on the present engine's port timing revealed a 160° exhaust period, a 130° period for the angled Schnuerle type ports, fore and aft, and a 126° period for the dual upwardly inclined "third" ports opposite the exhaust.

The checked induction period was a

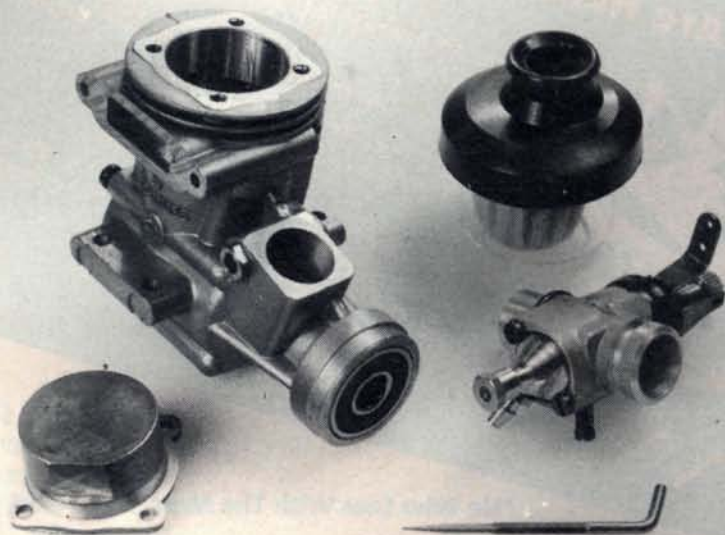
generous 205°, with the shaft type rotary-valve timed to close at 57° after TDC. The crankshaft follows standard ST practice in being masked and copper plated, before hardening, in order to apply the hardened skin only to those areas that require it.

The engine is of robust construction. For example, the beam mounting lugs, on either side of its longitudinally ribbed crankcase, are a generous 5.7 mm (0.224 in.) thick, the front end is strongly braced with lateral and vertical webs (and by the big rectangular section intake boss), and the short cylinder casing, with its solidly proportioned exhaust stack, has long lugs for secure muffler attachment. The engine seems well set up to cope with the rigors of off-road model car racing.

The need to cope with the effects of an off-road environment is also seen in the provision, as a standard fitting, of an air filter. This consists of four parts: an open-topped transparent plastic cylindrical body with a removable bottom of the same material to which the paper cup shaped filter element is cemented and, lastly, a black molded rubber base by which the complete unit is firmly fitted to the carburetor intake.

Incidentally, all four S.21/S.25 car engines are buggy or off-road types. Super-Tigre does not list a track-car version of the S.21. Instead, an entirely new rear-exhaust engine called the G.350, and having a claimed power output of 1.45 bhp at 27,000 rpm, is shortly to be made available.

Peter Chinn, c/o *Radio Control Car Action*, 632 Danbury Rd., Wilton, CT 06897.



Sturdy body casting is the same as that used for the substantially bigger S.29 model. Carb is familiar ST "Mag" type.



AYK

RADIANT

by MIKE LEE

4WD

from Race Prep

- ☐ Rip-snortin' killer!
- ☐ Way rad dude!
- ☐ Pedal to the metal!
- ☒ All of the above!



WHEN SOMEONE MENTIONS a four-wheel drive car, most of us think of the rip-snortin', ground-poundin' machines that are the terror of most race tracks. Admittedly, it takes a good four-wheel-drive vehicle to be able to withstand the abuse of the race track, let alone the rigors of sport driving in back lots of the neighborhood.

Four-wheel-drive development has gone through a lot of progress in the last two years. The cars have gotten lighter and faster, and are much less susceptible to mechanical breakdown than before. My first encounters with four-wheel-drive cars were disappointing because of the massive maintenance needed to keep them in one piece.

This latest review car has changed that, and has me liking the dirt killers a lot more while maintaining them a lot less. The AYK Radiant, imported and distributed by Race Prep*, is the latest from AYK in four-wheel-drive technology. It has a lot to offer in all-out dirt-grabbing fun.

THE KIT. The Radiant features some things not found in any other car, the most notable of which is the drive line, which consists of the motor pinion gear, main spur gear, and then straight to the drive chains, front and rear. There are only two gears in the whole car! Let's go through some assembly and see what makes the Radiant shine.



The chassis consists of a pair of gold-anodized aluminum side members held together by the rest of the car. It almost makes for a monocoque-type chassis. The mid-section supports also contain the chain guides for the drive lines, and the bottom features fiberglass armor plate. At the rear of the chassis, a large tail guard wraps around the motor from the rear top to the underside, providing plenty of rear protection. A fiberglass upper deck for the radio and electrical rounds it out.

The Radiant's suspension is definitely a quantum jump in quality for AYK. Twin wishbone arms are suspended by large oil-filled dampeners at the front and single wishbones with the same dampeners at the rear. All dampeners connect to the fiberglass shock towers above the chassis. I filled mine with 20-weight oil and set the spring rate fairly tight; which provided excellent dampening action all around.

Another outstanding feature of the Radiant is the inclusion of the basic ball bearings for the differentials. By today's standards, this is a plus. Additional ball bearings are available for all other friction points for about \$40 total. I opted for this, and ended up with ball bearings everywhere. If you're serious, get them.

The speed controller in the Radiant is another step forward for AYK. Here, we find a multi-band ceramic resistor type speed controller with full forward and full reverse control. Throttle response with the speed controller is rated very good.

Motivation for the Radiant is provided by a Race Prep stock motor. It is protected from the elements by a kit-provided dust cover that is a basic rubber tube with a foam end cover, a good feature because it protects from dust and dirt while allowing the engine to get cool air.

ASSEMBLY. Assembly of the chassis members goes rather fast, and before you know it, the tough stuff is done. Sandwiched in between the chassis sides are twin ball differentials driven by the chain. Both differentials are adjustable and come basically assembled. They do require some grease on the differential balls, however, and so you get to disassemble them after all. They're simple but effective units. A turn of an Allen wrench inside the inboard drive cup is all it takes to tighten or loosen the differential.

Set-up on the rolling chassis is pretty easy on the Radiant. Although camber and caster are not adjustable on the front end, at least you'll have toe-in/toe-out. All moving parts at the front are ball-link-mounted for smoothness. They're a bit tight at first, but loosen up nicely by working them a little. Wheels are mounted by a single self-tapping screw onto a pinned spindle.

At the rear, the camber is adjustable on a three-position inboard mount. Again, the wheels mount with a self-tapping screw into a pinned spindle. And what wheels! The Radiant shines with gold-anodized rims. That's half the battle to concourse already done for you.

The Radiant comes with a clear polycarbonate body which mounts to the chassis on two points, one forward and one aft. Mine was painted with Parma* paints sprayed on. Kit-supplied decals finished off the trim nicely. A 6-cell battery pack fits amidships in the chassis and is held there with a chrome steel strap. This will provide the Radiant with a central balance point. All radio gear mounts to the top of the fiberglass deck just behind the battery pack.

The radio used in this off-roadster was the Futaba* Magnum Junior two-channel (Continued on page 90)

Track Report

PROJECT

FROG

PART I

MRC/Tamiya

When we're through modifying this versatile Tamiya machine, it will be one tough reptile!



by FRED MUR



Above: The killer Frog ready to attack.
Below left: The Frog innards after metamorphosis.

IN AN EFFORT to present you with the best the radio control car market has to offer, Project Frog will follow in the footsteps of the widely acclaimed Project Grasshopper. There will be, an amazing transformation of the stock out-of-the-box puddle-jumping Frog to an awesome competitor that'll burn up the lilly pads. Before we describe the modified version, though, let's take a look at the very competitive stock Frog from MRC/Tamiya*.

In keeping with MRC/Tamiya's simple and reliable design, you can go from start to finish in 26 easy steps. The two-piece ABS resin space frame provides excellent durability and protection for the radio system components while providing you with the light

weight that many racers seek *after* their car is built. The suspension system is a front double-wishbone reinforced with a steel radius arm on both sides. The rear suspension is a trailer arm setup with oil-filled adjustable dampers for maximum flexibility. The type of front and rear suspension combination is designed for rough road surfaces and will enhance the high-speed straight runs, plus give you added maneuverability that off-road racing demands.

THE KIT. The kit provides you with the RS-540S motor and snap connectors for power and speed. This powerplant drives a sealed gearbox that has three gear ratios to choose from and is complete with kit-provided ball bearings. With gear ratios of 8.5:1 for low-speed off-roading and 7.3:1 for normal all around use to 6.7:1 for record-shattering runs, you can set your Frog up for just about any track.

The Frog sits on ribbed front tires and rear spiked tires held in place by the strong three-piece wheel that's so popular on many of the MRC/Tamiya buggies. Add to this the clear, tough, scale-like polycarbonate body, and the Frog kit is about as complete as any. The only additional boost might be to add ball bearings for the front wheels and the outer trailer arms.

PERFORMANCE. The overall performance of the Frog is enough to qualify this buggy as a serious off-road force to contend with. The Frog's wide wheel-base and low center of gravity result in great handling characteristics.

After a quick assembly, it was time to proceed to the track to see if the Frog would *leap up* to its reputation, or *croak*. The warm-up laps proceeded smoothly with only a small amount of oversteering that was easily adjusted in the Frog front suspension—due to the adjustable caster angle that is designed in this buggy, any oversteering or understeering can be dealt with easily. The Frog's front arm is held in place with a locking cap screw that will allow for change in caster angle. By increasing this angle greater than the normal 90 degrees, the steering response and oversteering problem are easily compensated for.

The test car is equipped with the 18-tooth pinion gear and 50-tooth spur gear for a gear ratio of 7.3:1, the normal setting according to the MRC/Tamiya instruction manual. The power response and top speed of the Frog with this setup is impressive for an out-of-the-box car. But remember, if you decide to change the gear ratio in your Frog, not only the pinion gear but the *spur* gear, too, must be

changed to prevent irreversible gearbox damage. When making this change, be extra careful to make sure that the wire ring for locking the spur gear onto the drive gear is fully seated, or it could mean instant destruction. The manual is very good in providing you with all the pinion-to-spur gear combinations, so take your time and read this section of the manual carefully.

Suspension changes and adjustments are readily accessible and easy at track-side, a must for any top performer. The brass drive gear provides positive power to the gearbox, but if there's a weak spot in the Frog, it's certainly found in the aluminum bevel gears. Aluminum does, of course, help save weight, but saving weight at such a stressful point in the gearbox by using this soft metal seems ill-advised, and a little risky. After a short time of track-testing the Frog, a faint gear-slipping noise ensued, most likely from rough driving and high jumping.

After an inspection of the gearbox assembly, it was determined that the half-shafts had done spline damage to the inside of the bevel gears. Replacement of the bevel gears was therefore necessary before returning the Frog to the track with a little less aggression in mind. It seemed the major damage had occurred from the jumping exercises imposed on the Frog. When the buggy is airborne the wheels and gears are under no stress, but when the initial track contact is made as the car returns to the ground, for a split second there is a tremendous amount of force on the gears, and it is at this point that the damage occurs. Whether this is due to the severity of our particular track test will be discussed in Part II of "Project Frog."

That's about it for the out-of-the-box performer, in the next issue of *Radio Control Car Action* we'll take this stock machine, address the weak points found during our track test, and modify the Frog into the most vicious pond-dweller ever to bark at the local catfish. So hang on to your lilly and hold your flippers for Project Frog Part II!

**The following is the address of the company mentioned in this article:*

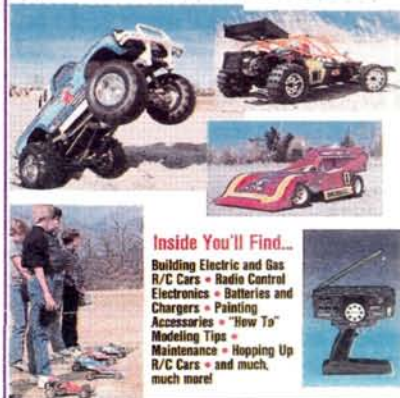
MRC/Tamiya, Model Rectifier Corp., 2500 Woodbridge Ave., Edison, NJ 08817. ■



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Track Report ::

by JOE BRUNI, M.D.

IT'S FAST, it's four wheel drive and it's a gas! The Stinger is the latest entry into the R/C world by Kyosho of Japan, distributed in the U.S. by Great Planes Model Distributors*. Kyosho is a respected world leader in off-road technology with proven high-tech winning models such as the Optima, Javelin, Turbo Optima, Rocky and Assault.

THE KIT. As soon as you open the Stinger's colorful sturdy box you'll notice that all the parts are either encased in damage-resistant plastic or blister packs. A 24-page instruction manual provides information on starting, trouble-shooting, optional parts and suggestions for further reading. Keeping with the Kyosho tradition, included are various odd wrenches, shock oil and grease that enable an easy assembly.

The Stinger is a highly innovative R/C model that includes a long list of features. The chassis is a double-decker design. The base pan is composed of a thick strong and lightweight aluminum while the upper deck or radio plate is composed of durable shock-

resistant plastic; both are separated by angled stone-guard plates that deflect rocks and dirt from the radio equipment and engine encountered during off-road racing.

The Stinger is a full-time four-wheel-drive buggy with a front and rear differential system connected by a tempered lightweight steel chain. The engine is sold separately but Kyosho provides the proper mounting hardware, muffler, air cleaner, fuel tank and clutch for several models. For this track report I tested the O.S. MAX CZ-1 .12 (reviewed in February 1987 *Radio Control Car Action*), which was a perfect fit.

The Stinger is well balanced thanks to a mid-engine sidewinder design that

drives the rear differential directly via a centrifugal clutch. The car also features a Kyosho race-proven four-wheel-independent suspension system similar to the famous Optima car series that includes strong and light EX66 nylon double-wishbone integrated suspension with four oil-filled fully adjustable coil-spring-over-damper-unit aluminum shock absorbers. Traction is provided by four low-profile spiked tires

(Continued on page 84)



1/10 Nitro Dirt Burner

KYOSHO

Stinger

from Great Planes



The O.S. Max CZ-1 .12 is perfect for your first gas car.





Wild!



AERODYNAMICS

by RICH HEMSTREET

AERODYNAMICS is the name of the game for full-size racers. Many race cars are first built in model form to be tested in wind tunnels before production of a full-size car takes place. Racing teams test their cars in wind tunnels as often as the expense permits, and aerodynamics experts are with many Indy car teams.

But do aerodynamics really make a difference in radio-control racing? Let's define some terms before we answer that question. What are we actually talking about when we say "aerodynamics"?

To racers, the two most important aspects of aerodynamics are drag and lift/downforce. Drag is the car's resistance to moving through the air. Lift/downforce shows whether a car will lose contact with the ground at speed or if it will be pushed down against the track as it goes faster.

Drag is determined by three things: the car's frontal area, the car's aerodynamic shape (Cx), and the airflow's dynamic pressure. Obviously the car's frontal area and the car's Cx are inherent to the car. The primary thing to remember about the airflow's dynamic pressure is that it increases with the square of the speed. It is four times greater at 20 mph than at 10 mph, not just twice as much. So the faster you go, the more impact aerodynamics will have.

The frontal area is figured out by looking squarely at the front of the car and measuring the flat plane area. For example, this will include the car's body and the exposed areas of the tires, but not the open space between the tires and under the chassis.

The Cx is determined by looking at the various shapes that make up the car. While this is quite complex and not an exact science, it can be done. For example, the 1/12-scale BoLink* Ford Thunderbird has an approximate Cx of .35. This compares with an MRP* Busch



Measure the frontal area of your car by looking at it from the front and using a ruler.



The spoiler is a flat surface designed to interact with the airflow and is attached to the rear of the car.

Hogan CanAm with a Cx of .33. By looking at only the Cx of the bodies, the Busch Hogan CanAm is about 5% better than the T-Bird.

Then you have to compare the frontal areas of the two bodies. The Busch Hogan has an area of 20.94 inches, compared with 25.75 inches for the T-Bird. Now, multiply the Cx times the frontal area to find the inherent drag of each body: Busch-Hogan CanAm $20.94 \times .33 = 6.9102$ versus Ford T-Bird GN $25.75 \times .35 = 9.0125$. The CanAm has approximately 23% less aero-drag than the T-Bird, even though the Cx was only 5% better.

When you discuss lift/downforce, you refer to body shapes and the various things that are done to change how the air reacts to the body. Wings and spoilers are added to racers, as are air dams or diaphanes. Some of these items may add to the frontal area of the car, while a diaphane may not.

For our purposes, a spoiler is either molded in or attached to the rear of the car's body, while a wing is suspended above the car's body. A diaphane or air dam is either molded in or attached to the lowest portion of the front of the car's body.

Now if you're still wondering whether any of this applies to radio-control racing, try this experiment to find out for yourself. Attach a 6-inch-tall Lexan spoiler fully across the rear of your car. Now go out and see what happens to your handling and top speed. The faster you go, the more effect it will have.



This BoLink sprint car has a large wing mounted over the driver's head.

Just like in full-scale cars, airflow influences a model car's performance.

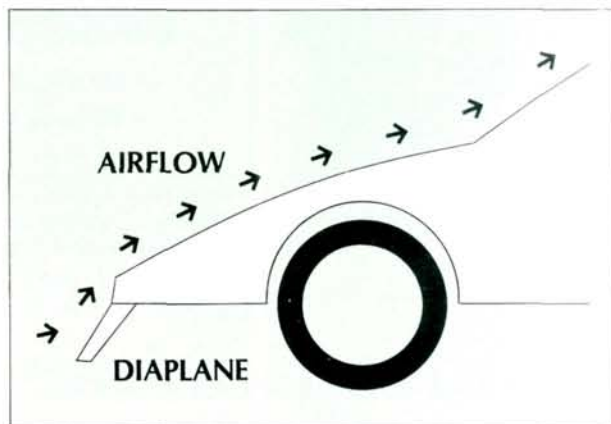
Next time I'll look at some things you can do to improve the aerodynamics of your car.

**The following are the addresses of the companies mentioned in this article:*

BoLink R/C Cars, 420 Hosea Rd., Lawrenceville, GA 30245-4695.

MRP, 18676 142nd Ave., N.E., Woodinville, WA 98072.

A diaphane helps to force the airflow over the roof of the racer, thus reducing lift and drag.



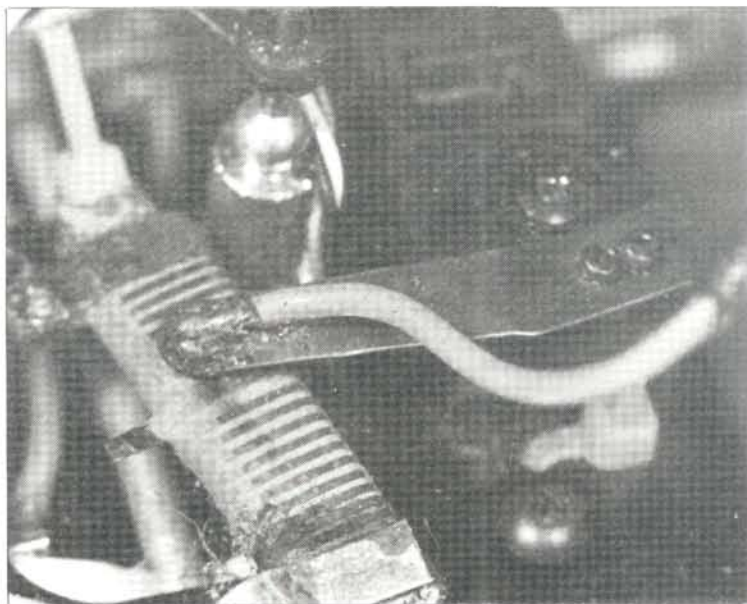
The Pole Position

by RICH HEMSTREET

PRACTICE makes perfect. Though an old saying, it is apropos of radio-control racing. Why is it that your best race of the day is usually in the main event? Because you have been forced to practice in the heats leading up to it. The more track time you put in, the faster you go!

Practice will cost time and money. Tires, fuel, and extra battery packs will be an additional expense for most racers, but one hour of concentrated practice will probably improve your performance more than the latest high-bucks megamotor.

There are three things to remember about practicing. First, always practice on a specific course. If you just do circles at random on a parking lot, it won't help you much. You need to set up an actual course to negotiate. You can keep it very simple; use chalk to mark the course or place markers at each of the turns. If you use



As added insurance, the wire connected to the wiper arm should be replaced frequently.



MRP's Lola T-900 is ready to carry Al Unser Jr. to victory at Indy.

markers, try to use something that will be resistant to moving, like plow discs. Otherwise, your course will change every time you hit a marker. Try to develop a smooth rhythm as you practice. This type of practice can be done on parking lots, or even in driveways with 1/12-scale cars.

The second thing to remember when

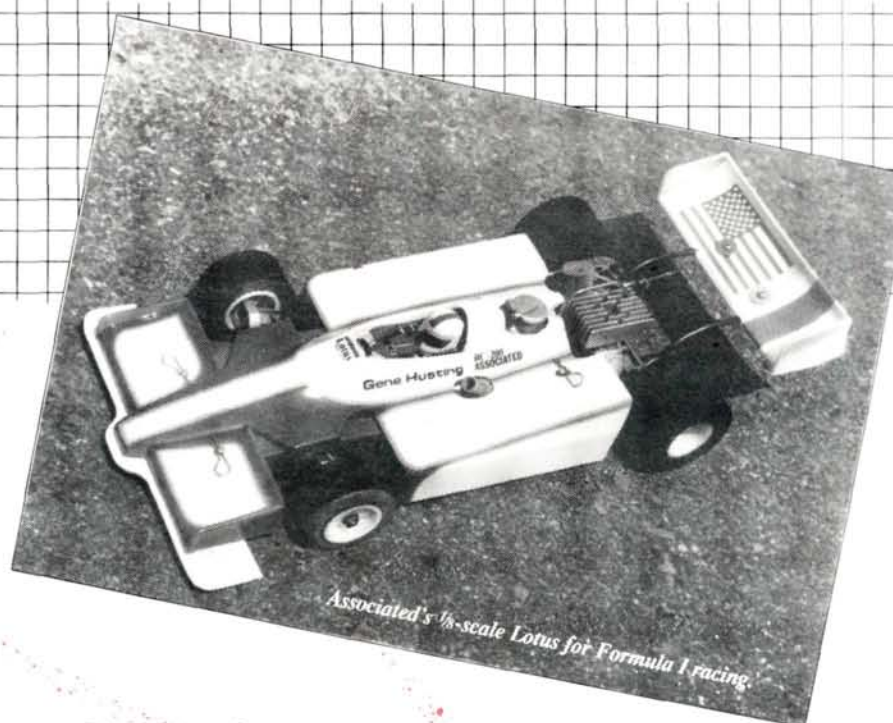
practicing is to avoid making more than one change to your car between each practice heat. This will help you figure out exactly what effect any single change makes on your car's performance. But the most important part of your practice is sorting out the driver, not the car.

The final thing to remember when practicing is to simulate your racing conditions accurately. If you run 8-minute heats, be sure you run 8 minutes of



The Chevy Cavalier, modified by BoLink, is a common sight on ovals in the East.

continuous practice. Avoid the temptation of running for 2 minutes and then pulling in to adjust your differential. The closer your practice conditions are to actual racing conditions, the more valuable your practice will be. Likewise, if you're running 1/8- or 1/4-scale cars, you should practice for both the 5-minute heats and the longer mains. This may involve working with a partner to provide a pit crew for longer practices. It's important to build up your concentration for the length of the races you run. Usually *skill* limits drivers more than their equipment does. So get out and practice!



Little Things Count

At the end of any racing series, you frequently see that it's the little things that

count. The broken wire here, the loose shock there; you have to pay attention to detail to be consistent. Many racers have lost a race because a wheel fell off. That usually happens either because the tires were put on in a hurry to get to the starting line, or because the tires were put on two weeks ago and never checked since. I remember one race where I lost my right rear wheel simply because I hadn't checked the nut that day. The 10 laps I lost made the difference between a third place trophy and fourth place.

Be sure to check the wiring of your battery packs at frequent intervals. With electric cars you should replace the wire connected to the wiper arm monthly. Also, watch very closely the wires that your battery pack plugs into. The wear that these wires receive may cause some strands to break inside the casing. While the car may continue to run, it could cause some loss of performance that you'll be hard-pressed to locate. Eventually, the wire will break completely, usually stopping you in the middle of a race.

Another area you may overlook is cleaning your bearings. How often you have to do this will depend on how dusty your track conditions are. Sooner or later, all bearings will need to be cleaned out. After you clean them, be sure to lubricate them. If your bearings are left dry, they'll eventually start rusting.

Check and tighten all screws and nuts on your car every race day. Some screws

(Continued on page 107)

OPEN-WHEEL BODIES

	1/12	1/10	1/8
Associated*	Foyt Indy Car, Lotus 79 Formula, Brabham Formula, Ferrari F1		Tecno 72 F1, Ferrari 312B3 F1, Wolf F1, Lotus 79 F1, Alfa-Romeo F1, Longhorn Indy Car
BoLink*	Chaparral 2K Indy Outlaw Sprint	Wedge Sprint, Outlaw Sprint, Cavalier Modified	
McAllister*		"The Gambler" Sprint Car	
MRP*	Penske PC-9 (Indy) "Outlaw" Sprinter	"Outlaw" Sprinter, Pinto Modified	Lola T-900 (Indy) Penske PC-12
Moody*	6 Sprint Cars, 39 Chevy Coupe, Supermod Oswego, Pinto Modified, Vega Modified, Mud Buss, Cavalier Modified, Olson Eagle	Mud Buss mod., Sprint Car	Mud Buss mod., Outlaw or Wedge Sprinters
Parma*	Lola T-700 (Indy)	Sargent Sprinter AMC Modified	A.J. Foyt Indy

Track Report



The Draggin'

from Advance Engineering

A 1/12 Electric Funny Car

by RICH HEMSTREET

BURNOUTS and blinding acceleration are both a part of drag racing. Now, Advance Engineering*, the producer of Mini Mags, brings the thrill of drag racing to 1/12-scale radio-control racing. Their new Draggin' funny car kit will put you in the fast lane.

THE KIT. The Draggin' comes complete except for the radio and battery pack. This 1/12-scale funny car is designed to use a 6-cell battery pack. A complete wiring harness is included, along with a detailed wiring diagram.

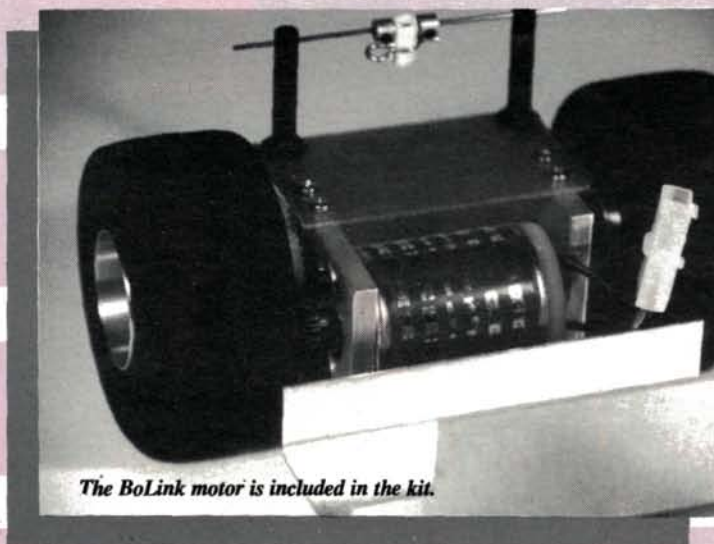
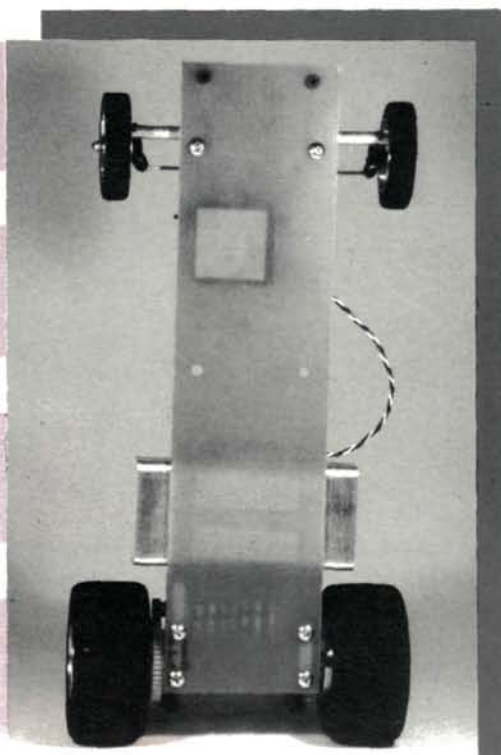


A simple flat pan chassis provides the basic structure of the Dragin.

The car has full ball bearings for very little rolling resistance. The front end has independent front springs, to allow for better weight transfer off the line. There is no rear suspension. The front and rear wheels are beautiful aluminum Mini Mags, of course. Impressive 2 $\frac{7}{8}$ -inch-diameter tires are mounted on the rear wheels. These tires will produce a great deal of speed and acceleration. No differential is used; the spur gear attaches directly to the wheel hub. A clear Dodge funny car body is included.

CONSTRUCTION. This kit is simple to build. The parts are well engineered and there is very little that the builder has to do other than follow the directions. The rear chassis stiffener had to be filed off on one end to clear the spur gear. The car is built to last; it should hold up to some horrendous wrecks.

I changed the body mounts to BoLink* body posts in



The BoLink motor is included in the kit.

of the car, to provide better traction.

While the Dragin is designed to run a 6-cell battery, there are groups that permit a larger number of cells to be used. Just be sure to protect your radio system from excessive power. The stock motor is mild, and with run times only in seconds, I'm sure all sorts of wild motors can be used.

Try something new—get a Dragin by Advance and see if you can avoid red-lighting at the dragstrip.

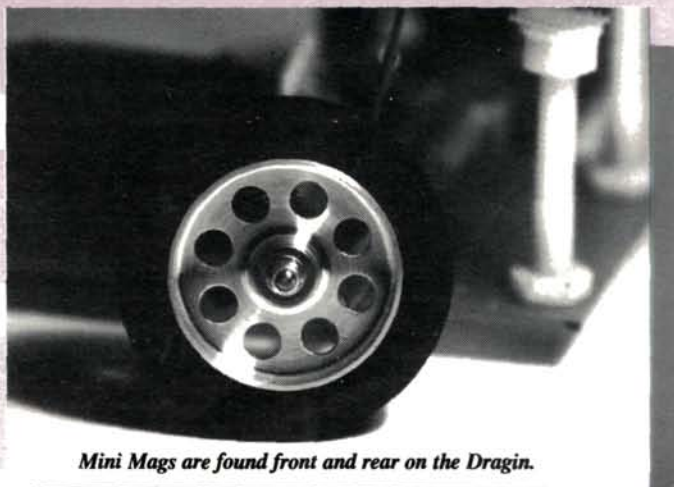
**The following are the addresses of the companies mentioned in this article:*

Advance Engineering, P.O. Box 766, Woodland Park, CO 80866.

BoLink R/C Cars, 420 Hosea Rd., Lawrenceville, GA 30245-4695. ■

the front, topped off with Velcro. While this does not make the body very secure, it does improve the aerodynamics by not poking holes in the hood. In the rear I also changed the body mounts, so the body can be raised up just like a full-size funny car.

PERFORMANCE. The Advance Dragin is built to go straight and fast. The key to straight line performance is the front suspension of the car. It's very easy to adjust the caster of the front end. Generally, the more caster, the easier it is to keep the car straight, and the less touchy the steering will be to driver input. If the car is set up properly, you won't be running any road courses with it. Keep as much of the weight as possible at the rear



Mini Mags are found front and rear on the Dragin.

Track Report

IT'S BEEN MY finding that you car-crusher crazies out there have an insatiable appetite for more monster trucks. Well, here's a new one to sink your teeth into. Varicom's* 1/10-scale Big Grizzly, with its 5.9-inch terra-wheels (giving Big Grizzly an overall height of 10.75 inches) and dual shocks on all fours, truly emulates the appearance of a full-scale car crusher. The Grizzly looks like it can roll over anything. To the best of my knowledge, it has larger tires and is taller than any of its competition.

The heart of the drive train consists of a tall reduction tower with a Mabuchi 540S motor mounted in-line up top. This tower is necessary for the housing of two spur gears needed for proper gearing-down to

Varicom **BIG GR** *Evil, Wicked, Me*

by BILL LANDAN



ZZLY

and Nasty!

compensate for those large-diameter tires. Remember a 5.9-inch diameter wheel is going to cover more ground in one revolution than a 3-inch diameter one will cover in a single revolution, thus the need to gear down in order to regain the mechanical advantage. At the bottom of the tower are two universal joint cups which mate with the drive shafts. The front drive train is a simple beveled ring and pinion metal gear affair with a fixed shaft with one-way bearings on the wheels. The rear differential is a ball-type again with beveled metal ring and pinion. The rear suspension is a live axle held by left and right trailing arms, allowing the rear axle to laterally differentiate. The front suspension consists of lower A-arms and rod ends. The wheel bearing upright supports are held in place at the bottom end by an Oilite bearing fitted into the lower A-arms and at the top by a nylon rod-end fitted to a ball joint. With

this setup you get a fluctuation in the camber as the wheel hits bumps, much like a full-size truck that has independent I-beams and king pins, the difference being that the degree of camber change in the model is greater due to the fact that A-arms are shorter than I-beams.

THE KIT. The rather large box, with about 40% of the space being



BIG GRIZZLY



Exposed chassis shows reduction tower with Aristocraft RX-540SD Technopower motor up top. Note CX-IIR KO speed controller to right of motor.

taken up by the tires and three-piece plastic rims, is filled with plastic bags packed with associated parts to help smooth out the construction process and to prevent shipping damage. For example, the small differential parts are conveniently found together in one bag. The blister pack contains the motor, one-way bearings, all the output joints and various shafts, gears, and the like. Incidentally, battery eliminator circuitry (BEC) is to be found with the mechanical speed controller.

ASSEMBLY. Since the instruction booklet has 35 illustrated steps with clear explanations of each, plus a parts column at the left showing an actual size drawing of the parts to use in that step, I think I can safely leave you in good hands with these instructions. I will, however, go over some things that should help you out. First, if you're a first-timer who has never built an R/C car, I recommend getting some experienced help, only because a kit such as this has a higher parts count than some of the simpler 2WD entry-level kits. Second, the kit I built was a preproduction run and I've been informed that small problems I encountered have been worked out in the production run. When fitting the shock tops to the shock body I found it necessary to ream out the shock bodies to accept the tops. This was easily achieved with a few turns of a tapered reamer.

Make sure you pay strict attention to the ball differential assembly and tighten it down very tight, otherwise you're going to end up with a differential that slips and will eventually blow. Don't forget those big wheels and the mechanical advantage increase due to the radius of the wheel. And while we're on the subject, the wheels are held tight on tapered axle



Hobby Shack's KO EX-5 was used for control.

ends, so make sure they're also tight.

The one-way bearings fit quite tightly into the rims, so a slight bevel around the edge of the six-sided recess in the rims solved the problem in short order. During test runs one of my one-way bearings broke and then the other one broke. Varicom has

(Continued on page 103)

Track Report

TYCO

Turbo HOPPER

by MIKE LEE



A neat little $1/12$ off-road puddle jumper!



Complete with transmitter and turn pylons (not shown), the Tyco Turbo Hopper is perfect for the younger neophyte.

NOT VERY long ago, the sport of radio-control cars was a sport for the guy with a few extra bucks hanging around and a knack for making little toys work. At least that's what most of the uneducated public thought. There was a real mystery behind anything that could be controlled without a wire connected to it.

Now our sport of R/C car racing has become the rage not only for real die-hard racers, but for average kids around the block too. To heck with slot cars and Hot Wheels, they want a real R/C buggy.

For the most part, our sport has not been the most economical of hobby/sports around. Ask any parent about R/C car racing and they just about faint at the thought of an expensive race

(Continued on page 104)

Installing and Understanding the (BEC)—Battery Eliminator Circuit

by MIKE LEE

YOU CAN make your R/C car lighter by eliminating the on-board radio battery and replacing it with power from the main motor battery. Commercially, this is known as a battery eliminator circuit, or BEC. There is little magic to it, two ways to accomplish it, and it only takes a few minutes.

The items needed are a soldering iron, a wired connector to the receiver, and either a Radio Shack 4005 diode or the Radio Shack 7805 Voltage Regulator. With the addition of about 10 minutes time, you can dump 5 ounces of weight from the car.

Begin this operation by removing the 4-cell radio receiver battery pack from the car. If you're not too squeemish, you can cut off the connector from the battery pack to the receiver, cutting it close to the battery pack end. Leave the connector fully intact. If you must be safe, get a whole new connector and start from there.

Now then, at the main battery connector of the car (the one on the car, not the battery), take a small screw driver and push in the tabs on the connecting pins inside the connector block. This will allow you to remove the pin from the

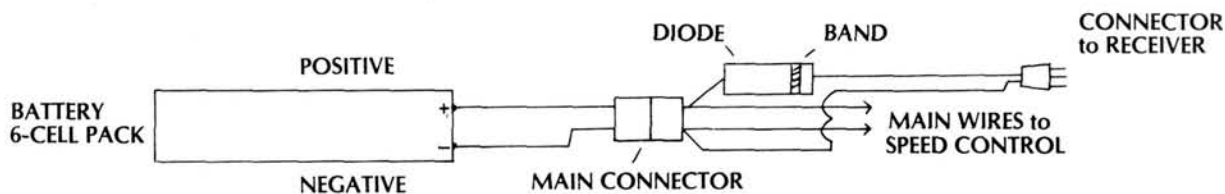


photo courtesy of MRC/TAMIYA

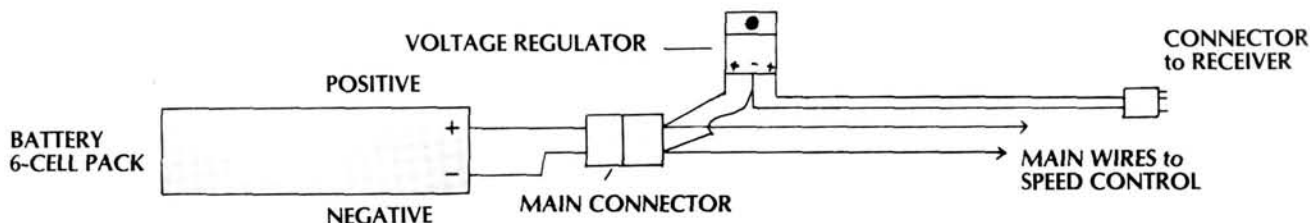
inside of the connector. Remove the red wire first.

For now, let's assume you're installing the diode. At the red wire, solder the diode to the red wire connecting pin right where the red wire is also soldered in. Pay attention here. The diode is polarized; that is, it works only in one electrical

direction. If you hook it up wrong, it blows out. Look for a small white band at one end of the diode. That is the positive end and it is *not* the end to solder to the connecting pin. The end without the white band is. Go ahead and solder the diode to the pin. Now take the red wire from the receiver connecting wire and



There are two ways to set up your BEC: above, using diode; below, using voltage regulator.



solder it to the diode on the end *with* the white band. You're halfway done.

Replace the connecting pin into the connector block and then remove the black, or negative, wire and pin from the connector block. Solder on this pin the black wire from the receiver wire connector. Do a good job and keep it neat. Once done, replace the pin into the connector block.

At this time check the following things: a. that the red wire from the connector block has the diode soldered to it with the white band out and the white band side connected to the red wire to the receiver wire; b. that the black wire from the connector block is connected to the black wire from the receiver wire; and c. that all solder joints are clean and neat with no big globs of solder that might touch each other. If all these things are correct, pat yourself on the back. It's all done and you're ready to hook up the car and run.

If you're using the voltage regulator, connect the red connector pin to a red wire. A short piece about an inch long will do. Now solder this short piece to the left side pin of the voltage regulator. You might want to use some heat-shrink tubing to insulate the pin and wire. On the right side pin of the regulator, solder the red wire from the receiver connector. On the middle pin of the regulator, solder a black wire first to the black wire pin from the connector block, then to the middle

pin of the regulator, then on to the receiver connector wire. That's it for the regulator, it's all done.

What you've done is to tap the power for the radio from the main motor battery. The result will be that the car will operate just the same, if not a bit better. You'll actually be supplying a bit more voltage

pit stop and recharge the battery. Virtually all the frequent race drivers use this system.

One final note. This setup is for 5-cell cars only; 7-cell cars need to use either 2 diodes in the line or the voltage regulator by itself. Either setup will work fine. Also, it's nice to know that this system will

BEC could mean a faster car with a bit longer runs.

to the radio, about 6 volts. However, there is a price to be paid for this conversion.

While running this type of setup, you'll eventually run out of juice from running the car. When this happens, the radio will also be running low on juice. If you keep trying to run the car, the radio and motor will both run too low on power with the radio signing off first. That means the car loses control, so it's important to watch for the battery beginning to run down. Thankfully, our rechargeable batteries run down suddenly and you'll see the car start slowing down. When it does, make a

prevent accidental reverse hookup of the battery to the connector. If you make that mistake, the diodes or voltage regulator will blow like a fuse and protect the radio from damage.

Try this little tip and save some weight. It could mean a faster car with a bit longer runs. ■

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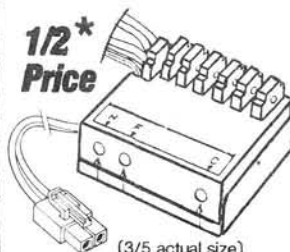
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MAGNUM SPORT

(Continued from page 20)

under the steering wheel. The Wheel Tension Adjuster is located to the right. Use a Phillips-head screw driver to adjust drag. Clockwise is more, counterclockwise is less. Adjust for your best feel. The Wheel Angle Adjuster thumb wheel can change the total operating angle of the wheel from a maximum of 38° either side of center to 30° either side of center. Maximum throw is counterclockwise. Above the steering wheel is its trim control, which allows neutral to be set accurately. Below the steering wheel and slightly to the left is the throttle trim control.

At the bottom of the transmitter is the battery pack, which is mounted as an integral part of the transmitter base. A slide cover on the bottom is removed to expose the battery location.

The salient parameters of the Futaba FP-2P Magnum Sport system are summarized in the chart.

In summary, the Futaba Magnum Sport has many desirable features, most significant of which are the pistol grip and servo-reversing. I expect to do another electric car in the near future and will have an opportunity to run the Magnum Sport. I know it is of the same quality as its big brothers, the Magnum and Magnum Junior. All in all, this was a very interesting radio to review with many fine features—try one, I am sure you will like it and the price is most attractive.

I hope you continue to enjoy our new publication, *Radio Control Car Action*, and if you have any questions, drop me a line and I'll do my best to answer them. See you in the next issue.

Charlie Kenney, c/o *Radio Control Car Action*, 632 Danbury Rd., Wilton, CT 06897.

*The following is the address of the company mentioned in this article:

Futaba Corporation of America, 555 West Victoria St., Compton, CA 90220.

TORNADO

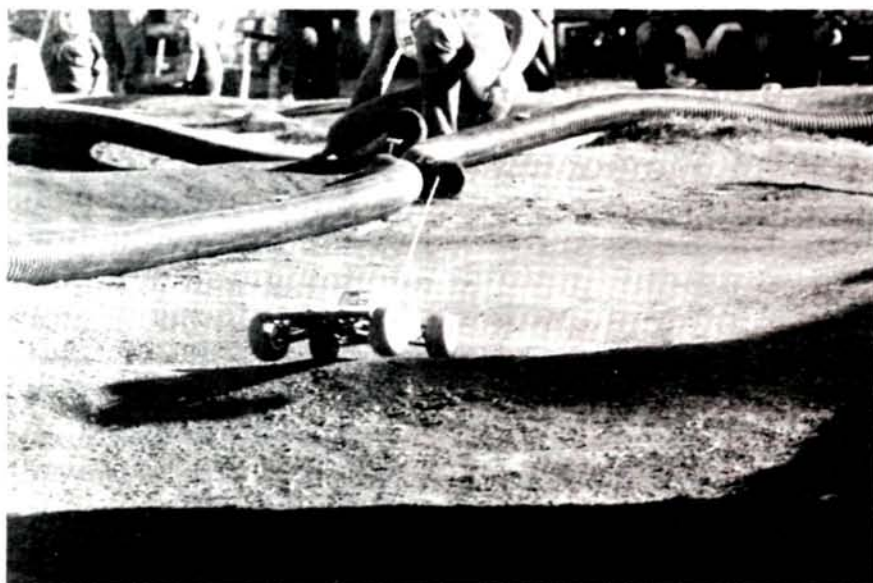
(Continued from page 24)

we have the ingredients for a darn good entry-level car. Well, that's exactly what we do have. It's this combination that sets the Tornado somewhat in a class of its own. Other ready-to-run cars I've tested were more in the entry-level league. Don't misunderstand me, the Tornado will need up-graded add-ons to realize its full potential, but that's true with almost any car as it comes out of the box.

(Continued on page 70)

Race Strategy

by DICK BRINTON



Proper positioning and speed are a must for a successful jump.

IN THE FIRST ARTICLE of this series we looked at the basic rules for getting you and your car ready to race and we developed some do's and don'ts for getting a perfect start, one where your car avoids the tangles that usually occur, gets the best line into the first turn and exits that turn in first place. Neat!

When you have a reputation for being a good starter, it makes your competition nervous and more likely to make mistakes. Naturally you want your competition to make all the mistakes in the book, as they certainly will if they're not reading *Radio Control Car Action* regularly.

Of course, even a perfect start is just that, a start. Then, suddenly, we're in first place exiting the first turn...what now?... Well, we rely on the information we collected when we *walked* the track earlier this morning. It's important to take a close look at the track before every race, and is absolutely vital when the shape of the track is changed every race day.

While walking the track we note the problem areas and decide on the correct lines through the turns, that is, where we want our car to go as we drive it around the turns or down the straights. We check

the whoop-de-do's to see if there's a way to fly over them all swiftly enough without crashing. We watch other cars in our class while they're practicing so we can get some ideas about who's quickest and where to pass.



Low line, middle line, high line, sometimes they all work.

Let's take a hypothetical turn to see what information we can *turn* up! Let's say this turn exits into the short straight that leads to the jump and if we hit the jump fast enough, we can clear the bad ruts that follow. So it's vital that we drive our car through the turn in a way that gives us the *highest exit speed* because this has a large effect on our speed at the jump.

Consider the following example. Let's say our car must be going 30 mph to clear the jump. Our car can accelerate 20 mph while going up the straight leading to the jump. This means our car must exit the turn leading to the straight at 10 mph, because 10 mph plus 20 mph equals 30 mph. If we exit the turn at 5 mph, we'll be at 25 mph at the jump and...CRASH! (Oh well....)

We don't have to know the figures to make the idea work for us as long as we recognize we must find a line that provides the highest exit speed from the turn.

So let's look at the turn.

How's the surface? Ans: Smooth inside lane and outside lane with holes in the center lane.

Is the turn banked? Ans: Yes, high bank at the outside lane.

Does it have an outside catch fence? Ans: Yes.

Is the catch fence smooth or will it capture our car? Ans: Made of board so we can touch it without hanging up.

Conclusion: We can drive the outside lane (known as the high line) all the way

around the turn. This gives us the highest exit speed because our car, though traveling farther, slows less while using the banking of the outside lane.

Easy when we apply a little logic to the problem.

A trip around the track always turns up a ton of hints that help us win races. Don't neglect this little walk.

Now that we know where we're going

to try to drive our car, how do we learn to make it go where we want it to go and avoid the crashes that happen so often? It's not easy but it can be done with practice.

One of the major difficulties for us R/C car drivers is lack of sensory input. I mean, the only connection between us and our car is our eyesight and, sometimes, our hearing. How different from the person driving the race car while sitting in it.

I was used to feeling the acceleration, braking, the noise, the view from inside the car, the smells of a hot engine, all the so-called seat-of-the-pants feelings.



Oops!

We don't get these seat-of-the-pants inputs in R/C. So we have to develop our eye-hand coordination to the max, until we actually develop a feel for what our car is doing.

How?

By learning how to "see" a race while we're right in the thick of it.

When driving our cars in competition, we all tend to focus tightly on the car itself. When I started driving R/C cars, I frequently ran off the track because I was focused so tightly on my car that I didn't notice the turn coming up. How embarrassing!

We've got to learn to "see" differently and this takes practice. Have you ever noticed how much easier it is to watch a car running around a track when you're not the driver? You see the collision coming long before the driver does and sometimes wonder how on earth the driver could've made such a mistake. (Then we go up onto the driver's stand and make the same mistake ourselves.)

When we're not driving the car we have only one thing to do and there's no pressure on us so we can see ahead to the upcoming problem. When we're driving our own car, this is tough...but not impossible. All it takes is the right kind of practice. Try this.

Step 1. Select a car that's being driven by one of the better drivers. Focus on it, as you would if you were driving, then try to become aware of what you're seeing out of the corners of your eyes. Soon you'll find yourself seeing more and more. You're developing *wide-angle vision*. You'll become aware of other cars even before they come close to the car you're watching.

Occasionally you may find yourself looking away from the car to pick up what's coming up. This doesn't work when you're driving. You can't spend time looking around, so get your eyes back on the car and try to develop that wide-angle, peripheral vision.

Actually, your eyes see the events all the time but your mind doesn't translate what your eyes see into useful information without practice.

Don't get discouraged. I guarantee you'll be able to do it if you're willing to practice hard.

Step 2. When you've mastered the first step, go get your transmitter. Again, pick a car that's being driven well, only this time, while you're trying to widen your vision, pretend you're also driving the car

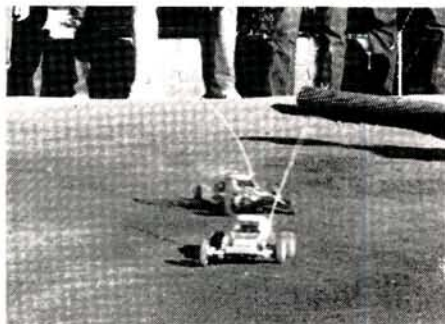


A good start, some bad starts.

and try to follow its path with your transmitter controls. Do this, of course, with your transmitter turned Off.

Now that you've added the transmitter, things get a little tougher. Remember, you're still trying to be able to see not only the car you're watching but also the cars,

turns, wrecks, etc. that are coming up. Don't worry that you can't follow the car's movements accurately with your controls. Your efforts on the transmitter are just to complicate things a bit. You're working up to being able to see your car and track events while you're driving in a tight race. Practice until you can do it well.



High-pressure racing brings out the best and the worst of a driver's ability.

Step 3. Now it's race time. Your car is on the line and you're standing up on the driver's stand. If you're like most of us, you're a bundle of nerves. And you're fighting hard to keep your nerves from taking over. It happens to all of us.

But you did prepare yourself didn't you? You're not standing up there cold are you? The first time I raced a radio-control car my mind was a blank because all I wanted to do was Race. Oh boy.

The answer is simple. Before you get up on the driver's stand, think over the start, the line through the first series of turns, and seeing wide-angle while focusing on your car.

At this point, that's enough to think about.

In future articles in this series we'll talk about special techniques for driving various parts of the course, passing strategies, and evaluating the competition, *plus* we'll talk a bit more on "psyching" the competition.

See you at the track.

Dick Brinton, c/o *Radio Control Car Action*, 632 Danbury Rd., Wilton, CT 06897. ■

TORNADO

(Continued from page 66)

including the full kit offerings.

The Tornado's chassis is a fully enclosed bathtub type with an in-line Mabuchi RS-540S motor and an in-line

battery that is mounted from the underside of the chassis by means of an access hatch. All the electronics are completely enclosed save the speed-control resistors (three-stage forward and reverse) which are under a protective cage.



TURBO SCORPION



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COX HOBBIES

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THE KIT. Since there is no "kit" in the strictest sense of the word, I'll simply call this section "The Contents of the Box." Monogram literally gives you everything you need to start racing now, right down to the Duracell batteries needed for the two-stick transmitter and receiver. This of course also includes a 7.2-volt Ni-Cd pack and charger. The charger is of the overnight variety, which is great for getting 100% full charge but you will want a fast charger if you don't already have one. The body and wing are painted in red, yellow, or blue, depending on the frequency you choose. A total of 6 frequencies are available for \$10 a set from Monogram.

You'll also find in the kit a motor support strut that snaps in place in two seconds. The instructions say to put it in if you intend to use the car in rough terrain, but of course we want to go rough-riding, so my suggestion is to put it in even if you're going to run the car on pavement. It can't hurt. The motor also has a plastic dust cover. You might want to take this off for a few runs on pavement to keep the motor cool while breaking it in. Be sure to stay away from too much dirt for those first few runs.

(Continued on page 84)

NEW

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**The race for 2WD supremacy is grueling—
Kyosho claims this is the next victor!**

by RICH HEMSTREET

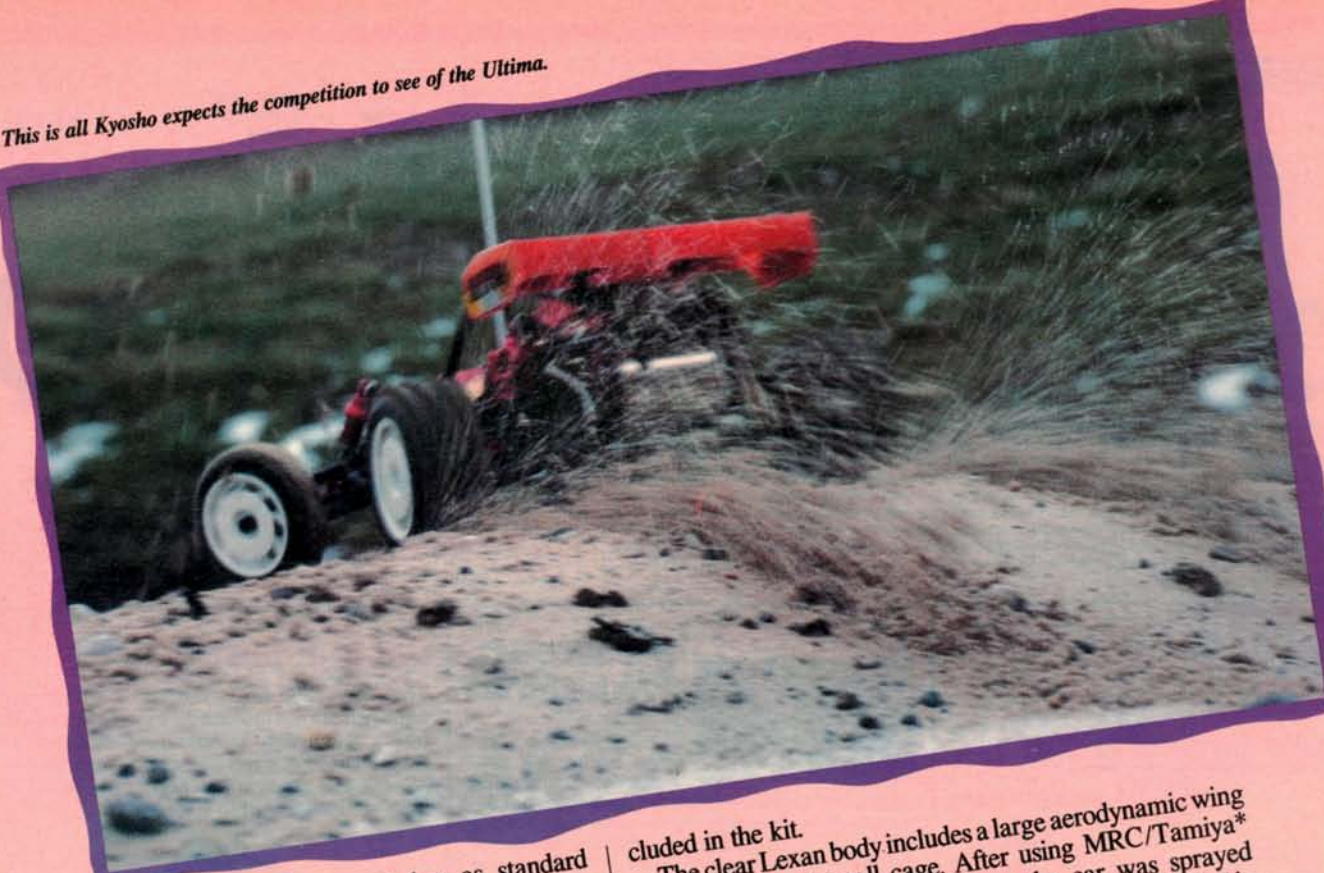
GREAT PLANES Model Distributors* boldly claim the Kyosho Ultima will be the next two-wheel-drive off-road world champion. After the success of the four-wheel-drive Optima, the competition should look out. Kyosho has spent a year developing the new Ultima. The Ultima is ready to challenge the world.

THE KIT. The Ultima comes in a colorful package. The illustrated 24-page instruction book is easy to follow. The last two pages of the instructions are very helpful; they show full-size drawings of the small parts required for each step. An aluminum chassis is the backbone of the Ultima.

The car is complete except for a radio, batteries and a charger. I used the new Pulsar Pro 2000 radio system and the Hobbico 12-volt multicharger, both available from Great Planes.

CONSTRUCTION. With just simple hand tools, the Ultima goes together easily. The instructions are broken down into 43 concise steps. The gearbox and rear suspension are built in steps one through eleven. In steps 12 to 16, you complete the front suspension. The front and rear suspensions are largely built of EX-66 nylon for strength and light weight. Lower A-arms and upper control rods provide for plenty of suspension travel. Each corner of the suspension has an oil-filled coil-over shock absorber.

This is all Kyosho expects the competition to see of the Ultima.



The front suspension has an anti-roll bar as standard equipment. The instructions give some handling advice about when to use the anti-roll bar and when to take it off. The Pulsar K-88 servos bolt right into place. These servos would be too large for most $1/12$ -scale cars, but they're perfect for $1/10$ -scale cars. The servos are quick and give positive control responses. The receiver is light and no problem to

cluded in the kit.

The clear Lexan body includes a large aerodynamic wing that mounts to the roll cage. After using MRC/Tamiya* paint markers to detail the driver, the car was sprayed orange on the inside of the body. Stick-on decals supplied in the kit made the simple paint job look great.

The multicharger has a discharge cycle that is connected to the ammeter. This helps you to cycle your batteries completely before recharging. When you do recharge, you can variably adjust the rate of charge. The

electronic timer gives you a choice of 3 minutes to 30 minutes before the alarm goes off. There is a handy reference chart on the side of the charger to help you determine the rate and length of charge for your battery pack.

PERFORMANCE. Driving the Ultima was fun. This car takes bumps and ruts in stride. After jumps, it comes back down on all fours. The rear end really gets good traction. The low-profile tires help keep the center of gravity low for better stability.

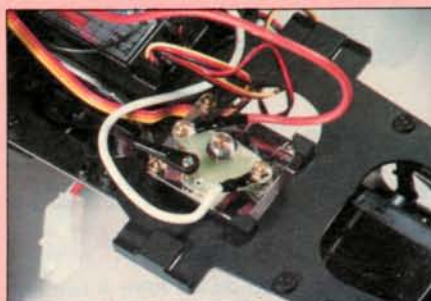
(Continued on page 107)



The Pulsar Pro 2000 transmitter is easy to handle.



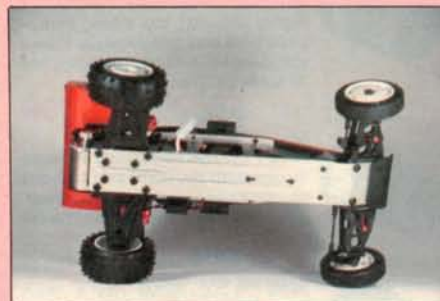
The gear ratios are easy to change, just remove the gear cover and you'll find the aluminum motor pinion.



The three-stage resistor speed controller attaches to the radio tray.

install. The aluminum chassis provides the foundation for mounting the suspension system. This chasis is very light and sturdy.

A three-speed-forward/one-speed-reverse, resistor type speed control is mounted on the radio tray above the batteries. I used the Kyosho 7.2-volt racing battery pack for power. A Mabuchi RS-540S motor is in-



The aluminum chassis is sturdy and lightweight.

photos by RICH HEMSTREET

Build Your Own Tweak Board For Just a Few Dollars

by MIKE LEE

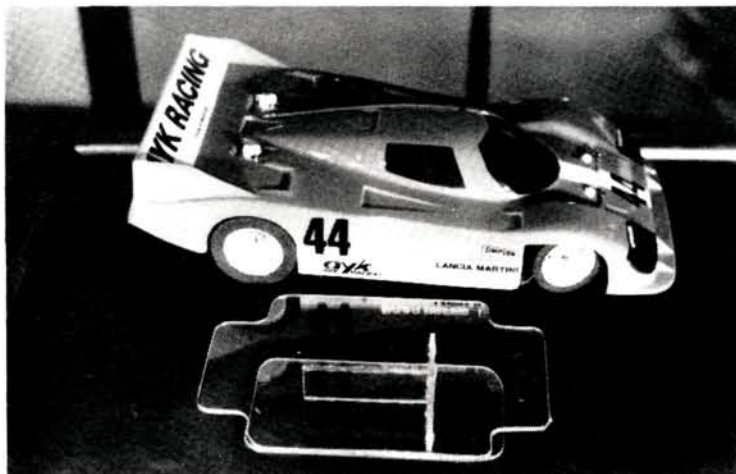
ENTHUSIASTIC sport and race drivers know what it's like to put a favorite car on the shelf for a few days, only to later find that the tires have got a flat spot on them. This is particularly true for the road-racing bunch who use the sponge rubber tires. The rubber will flatten from the weight of the car and it's almost impossible to get the flat spots out.

At the same time, many of us have wished we could place the chassis on a nice flat surface to see if it is tweaked, without removing all the wheels. Of course, if we didn't hit the barriers, the chassis wouldn't get tweaked, but it does happen and a tweaking board is sure nice.

This tweak board and car stand will fill both needs quite nicely and it's inexpensive. The construction is simple and easy for anyone who has a ruler, a marker pen, a Dremel scroll saw, and about 30 minutes. The only required materials are a sheet of plastic and some compatible adhesive.

The plastic can be of ABS, Plexiglas, poly or butyrate, or polycarbonate material, just to name a few. All are suitable in thicknesses of $\frac{1}{8}$ inch, an ideal size because it is thick enough to hold the weight of any car without flexing and not too thick to cut easily. You can buy it at most hardware stores and glass houses. Buy a sheet at least 8 by 24 inches, which will produce three stands. Try and find the plastic that has a protective paper covering as it's much easier to work with. If you can't locate this type, then you'll need a permanent ink marker pen to draw lines on the bare plastic. Look around and you'll find virtually any color plastic you want. For this article, I used clear polycarbonate plastic, the same used in our car bodies.

Begin with marking out the three basic parts of the stand, the top, bottom, and supports. Figure 1 shows how to draw the parts. If you intend on using the stand for $\frac{1}{10}$ -scale dirt cars, you'll have to make the supports wider to raise the top. The full-size drawing is for $\frac{1}{12}$ -scale road cars.

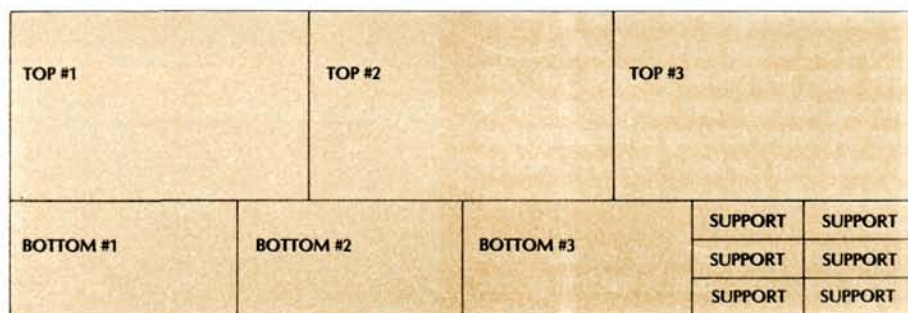


Our finished tweak board/car stand next to a potent race car. The board will complement any race, plus keep the soft tires from going flat during storage.

Once you've drawn all the parts on the plastic, begin cutting them out. A fine-tooth blade on the Dremel saw works well here. If you can't get hold of one, a hand saw will work, and with some plastics, you can make a score cut and break off parts in a straight line. But do try to use the power saw as it's much easier.

When you have the parts cut out, round off the corners to make the stand look professional. See Figure 2. On the top part, cutouts are made to allow the wheel to fall through. Don't forget, one of the reasons for this project was to keep from getting flat spots.

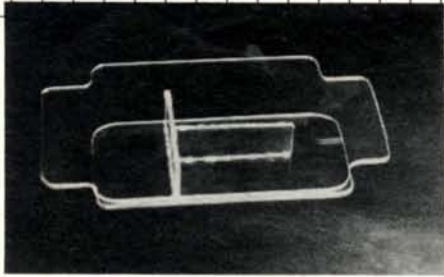
Now that you have all the cutting done,



24X8-INCH PLASTIC SHEET
FIGURE 1



FINAL CUT OUT PARTS
FIGURE 2



Finished product in clear plastic. Colored plastic can be purchased or the builder can custom paint.

check the top parts against the car you're going to sit on it. The wheels should not rest on the top plate. If this looks good, go to the finishing stage, which is done by simply sanding the edges of the parts with sandpaper to remove any plastic burrs or rough edges. At this time, peel away the paper covering.

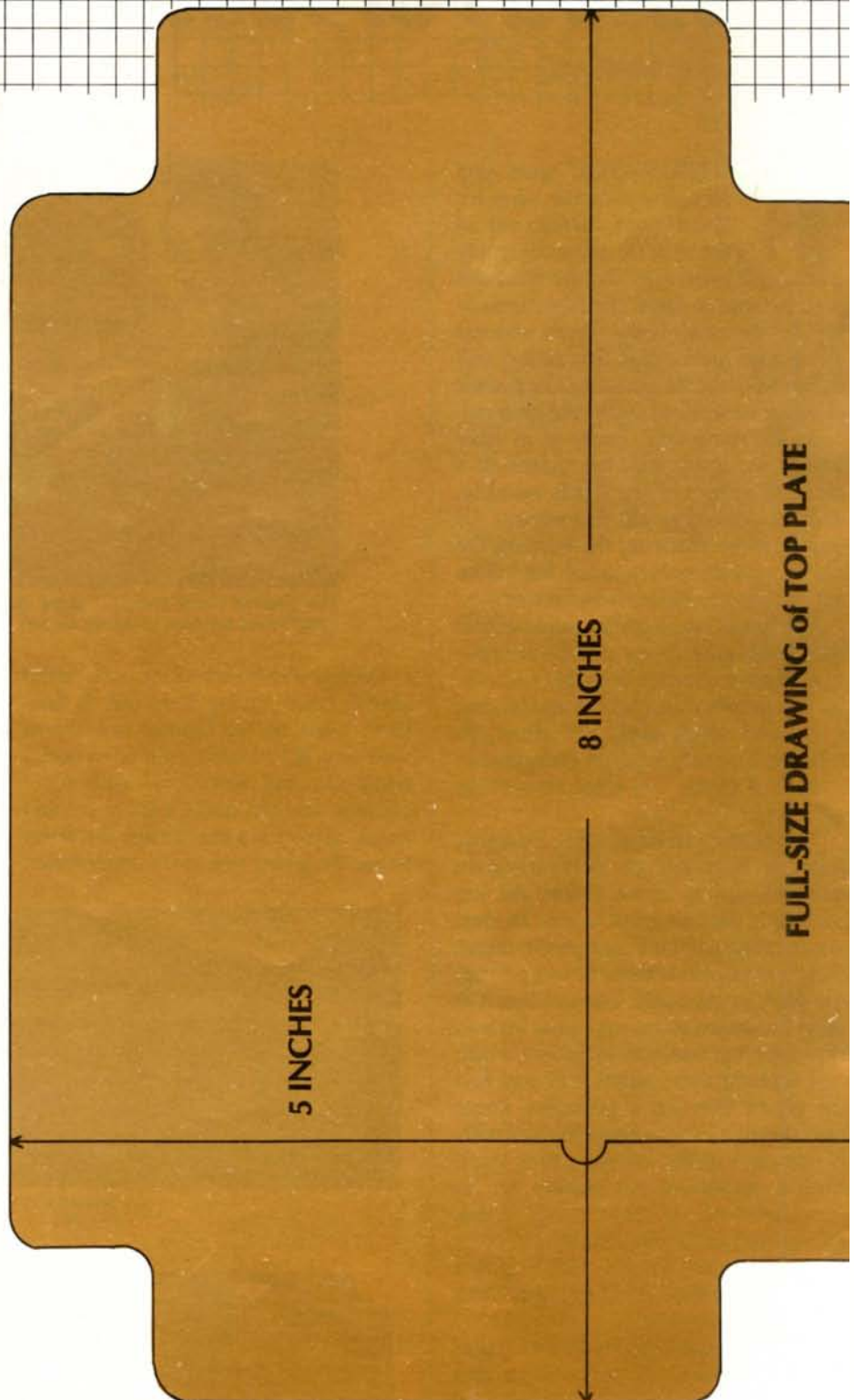
The last part is the stand assembly. I used Satellite City's* Hot Stuff Super T adhesive to put mine together, and this adhesive should be compatible with most plastics. The assembly is super simple, yet the stand will hold the weight of ten cars and then some! Once the glue is dry, the stand is ready for action.

Obviously, keeping the tires from developing flat spots is easy to do with the stand. And keeping the chassis in proper tweak is a simple matter of look and see. But now you have a stand you can proudly display your favorite car on. It can be painted with any of the paints used to paint your car body. Either painted or clear, it will add a touch of class to any car.

So now you have no excuse. This tweak board/car stand is fast and simple to make, and it's functional. Why not be the class act at the track? Build a few car stands and you will be.

**The following is the address of the company mentioned in this article:*

Satellite City, P.O. Box 836, Simi Valley, CA 93062. ■



TORNADO

(Continued from page 70)

ASSEMBLY. Okay, here we go. Install the AA batteries in the transmitter and the car, thread the antenna in the antenna tube, insert it into the car, wind the remainder of the wire to the outside of the tube, and tape it down. Pull the pre-cut decals from the sheet, place them to your fancy, and go racing. If you do break something, a full parts and price list is included with the kit. I have two examples, a red and a yellow, and have had no problems thus far. These cars seem to be constructed of a good-quality non-brittle plastic.

PERFORMANCE. As the car comes out of the box the suspension is quite mushy and the shocks are not oil-filled. The stock car exhibits body lean and understeers in high-throttle sweeping turns. By the same token it's the understeer that will keep the novice from over-correcting. The car as it comes is great for the beginner simply because it tracks so well in high-speed straights, something that gives the neophyte trouble.

While we're on the subject of speed, the Tornado showed very good speed while retaining good duration. This is in

part due to the very-friction-free drive train and differentials, an extremely important consideration for a competitive car.

The stock Tornado can negotiate tight turns with the proper technique, it's just under hard acceleration that the understeer takes over. No need to worry though, Monogram has just the ticket when you feel you're ready to move ahead: oil-filled shocks with stiffer springs and a ball-bearing set.

The only flaw I've found so far is the lack of adjustable tie-rod ends. The fixed tie-rods are set right however, with slight toe-in. Both of our test cars tracked exceedingly well with a very predictable steering feel. Since the tie-rod ends are connected with ball joints, you can always replace them with threaded adjustable after-market types of your choice for a few bucks.

Now there's a four-wheel-drive entry-level ready-to-run car that the owner isn't going to set aside when he's ready for more performance. In many ways the groundwork has been laid, all you do is add the spice and whatever else it takes to fine-tune a car to your liking. If my feeling is right, this will be a popular car and many of the after-market manu-

facturers will be offering other goodies to fit it.

**The following is the address of the company mentioned in this article:*

Monogram Models, 8601 Waukegan Rd., Rd., Morton Grove, IL 60053. ■ •

KYOSHO STINGER

(Continued from page 45)

mounted on lightweight nylon oversize wheels that enable the Stinger to tackle any terrain. In order to assemble the car you'll need some extra tools such as screwdrivers, pliers and a hobby knife.

Additional items not found are a glow plug battery cord, dry-cell 1.5-volt battery, good-quality nitromethane glow fuel and a two-channel radio-control unit. I chose the new Kyosho Pulsar Pro 2000, which is a very economical patented precision-balanced wheel-operated pistol grip radio that features such things as quick-change right- and left-hand conversion, servo reversing-switches and much more. The system also includes two compact high-torque KR-88 servos and a mini KR-2M receiver boasted by Kyosho to be one of the smallest, lightest receivers around today.

ASSEMBLY. The Stinger is assembled

Silencers
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Exhaust Systems For
Airplanes, Cars, Boats
Effective Noise Reduction
Lightweight Aluminum
Various Stack Lengths



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in 40 simple-to-follow steps that take about three hours. Because gas-powered cars are notorious for engine vibration during operation, before assembly it's important to use a thread-lock compound and apply it to all stationary screws and bolts in order to avoid unnecessary loosening.

As with many R/C car kits, the Stinger assembly begins at the differential. Differential assembly is usually an arduous task, but not so with the Stinger kit because the differentials are preassembled by Kyosho—but beware: you should disassemble the differentials and apply lubrication to avoid premature gear wear. (There are exploded views of the differential in the back of the manual for those who may forget proper reassembly.) The most difficult decision during the first 12 steps is deciding which front differential sprocket size to use when connecting the chain system to both differentials, 18 or 19 teeth. I chose the 19-tooth sprocket for more speed.

Next is the addition of the extra long wishbone suspension arms. The arms are constructed of a revolutionary lightweight EX66 nylon that enables the car to plow over any type of terrain without the worry of cracking or breaking. Power is then transferred from the differential system to

all four wheels via unique dog-bone swing shafts. Kyosho preassembles the shocks, so only the addition of shock seals and shock oil is required. It's important to add the right amount of oil to each shock piston case for the shock to operate properly.

Engine installation will go very smoothly if one of the suggested engines is used. I followed the instruction manual exactly using the provided hardware for the O.S. CZ-1 and the results were flawless. It must be emphasized that during clutch assembly the pilot shaft should be tightened to maximum torque with the addition of thread-lock compound, because the shaft can easily loosen.

The Kyosho radio system was a perfect fit because of the pre-cut radio plate. Fuel tank and side guard installation followed. Body painting and application of the provided pressure decals completes the job.

PERFORMANCE. There are three possible methods of starting the O.S. MAX C-Z1. Included in the Stinger kit is a unique zip starter, and a rope style pull cord comes with the engine kit. I chose another method, a 12-volt electric wheel starter that's applied to the cone located on the engine shaft and rotates the engine by friction. Once the 1.5-volt battery cord

is attached to the glow plug, you're ready for ignition.

If you're unfamiliar with gas-powered models you should know that these engines require using approximately 6-10 tanks of fuel in order to break in. You should concentrate on varying the speed and terrain differences as often as possible during this break-in period allowing the engine to encounter a variety of workloads.

For my first run, I used a 15% nitromethane blend to fuel the Stinger—but it seemed to hesitate and bog out. I then switched to a 10% nitromethane blend that made a tremendous difference in overall performance. Over the next four runs I tinkered with the pre-set carburetor air/fuel adjustments and the car began to *scream* around the track. It was time for serious driving....

The Stinger was quick and responsive initially, and as time went on the car became noticeably faster in each lap. The four low-profile spiked tires merely clawed any terrain the Stinger encountered. No jump was too high due to its wrenching power—The car stayed suspended for extended periods after each

(Continued on page 90)



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Troubleshooting

by FRED MURPHY

Choosing the right motor.

I WOULD like to thank you readers for all your input. You are the inspiring force behind this publication, so keep those letters coming, they give everyone a handle on what's important to you.

Past "Troubleshooting" articles have been aimed at trouble spots or weak points in many R/C cars that have been introduced into the market place, but this article I'm going to address a question that has come up repeatedly: "What's the best motor to use?"

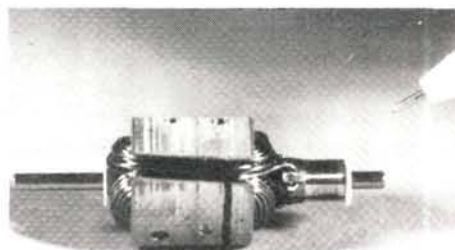
Well, this is an open-ended question that's hard to answer without knowing all

the Kyosho LeMans series of motors from Great Planes Model Distributors*. There are nine LeMans motors available that are suitable for use in cars, boats, and planes, with one main factor evident for all nine: high-performance.

LeMans model numbers are based on the motor's approximate running time in seconds, using a fully charged 6-cell, 1,200-mAh pack. A LeMans 600E will run about 600 seconds or approximately 10 minutes. There's also a letter designation after the model number, for example, 480T or 240S. This letter has meaning as to the LeMans motor's performance. The letter "T" designates the LeMans motors with high-torque and the letter "S" stands for speed, the motors that generate the highest rpm.

For comparison, the RS-540 motor that most of the R/C kits come with has a normal rpm of approximately 12,500 with the armature having 27 winds of 22-gauge (0.65 mm) wire. Just keep this fact in mind as we proceed and you'll get a good idea of how the RS-540 will perform up against the LeMans series motors.

The Kyosho LeMans motors, except the 600E and the 360ST, are equipped

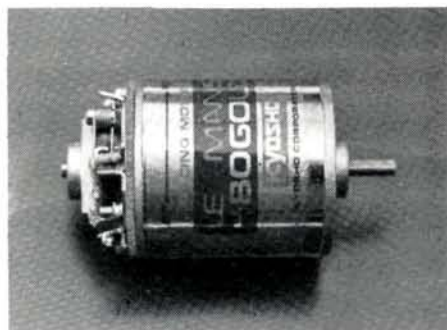


The heart of any motor, the armature. The number of windings and gauge of wire determine specialized use. Note drill holes for balancing.

with ball bearings at both ends. The two exceptions have the traditional metal bearing or bushing as used in the Mabuchi RS-540. The rest of the LeMans series have ball bearings and are labeled as follows: 360PT, 360G, 240SB, 240S, 480T, 480S, and 480G.

The model 600E is a good all-purpose motor for any off-road buggy. It will give a long endurance time and more torque than the standard RS-540. The armature uses 30 turns of 0.70-mm wire, with a maximum revolution of 17,000 to 18,000 rpm.

Model 360ST is designed for 1/10-scale off-road machines with a fixed timing of



LeMans offers a wide range of powerplants for all purposes.

the facts, but let's take a look at some general rules and hopefully many of your questions can be answered. First, if you're racing with a club, check their motor rules for the class you'll be competing in. Second, determine how long the races will be, 3 minutes, 4 minutes, etc. Third, will you need a motor to provide you with top-end speed for long straights or do you need a motor with a lot of torque for difficult tracks with a lot of turns? These are the type of facts you must have before you can begin your motor search.

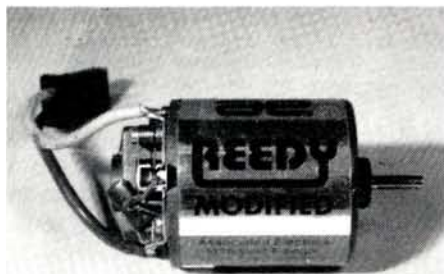
With the recent boom of the R/C car market the number of motor manufacturers is increasing every day, but for the purposes of this article I'll concentrate on

Specifications:

Motor	Armature	Max. Revolution	Bearing
LeMans 480G	0.40mmx25 Turn	21,000 - 22,000 RPM	Ball Bearing
LeMans 480S	0.80mmx24 Turn	21,000 - 22,000 RPM	Ball Bearing
LeMans 480T	0.75mmx26 Turn	20,000 - 21,000 RPM	Ball Bearing
LeMans 240S	0.90mmx19 Turn	24,000 - 25,000 RPM	Ball Bearing
LeMans 240SB	0.65mmx19 Turn	29,000 - 30,000 RPM	Ball Bearing
LeMans 600E	0.70mmx30 Turn	17,000 - 18,000 RPM	Metal
LeMans 360G	0.65mmx18 Turn	22,000 - 23,000 RPM	Ball Bearing
LeMans 360PT	0.90mmx19 Turn	20,000 - 21,000 RPM	Ball Bearing
LeMans 360ST	0.85mmx22 Turn	20,000 - 22,000 RPM	Metal

15°. This motor has 22 turns of 0.85 wire on its armature to produce an rpm of 20,000 to 22,000. Once again this is a good all-around motor giving a slightly higher rpm output than the 600E.

The next two motors in the LeMans series are the 360PT and the 360G. The PT version is an extremely heavy-duty powerplant built for off-roading. The armature is equipped with 19 turns of 0.90 wire for an rpm range of 20,000 to 21,000. This is one of the torque motors in the LeMans line. The G version offers a higher rpm range for the straightaways but doesn't sacrifice the torque that the 360PT gives. The 360G armature has 18 turns of double 0.65 wire with an rpm range of 22,000 to 23,000.



The Reedy motor is among the awesome performers for off-road use.

From the 360 series motors we move up the line to the 480 series and look at the 480T, 480S, and the 480G Gold motor. The 480T and the 480S motors were designed for racers of 1/12-scale, with the 480T supplying the torque for difficult tracks with lots of turns and the 480S providing a bit more top-end for the large oval facilities. The T version is wound with 26 turns of 0.75 wire producing 20,000 to 21,000 rpm, while the S version of the 480 has 24 turns of 0.80 wire on its armature giving a 21,000 to 22,000 rpm output.

The class act of the 480 series motors is the 480G Gold motor. This is a great 8-minute powerplant for all conditions. It has an armature with 25 turns of quadruple-braided 0.40 wire, producing a modest 21,000 to 22,000 rpm, but has the duration to go the longer distance that some racing requires.

Let's look at the LeMans 240 series motors. Keep in mind that we're now talking about a 240-second or approximately 4-minute powerplant. The 240S is the 4-minute motor in the line for very high rpm and all-out sprinting. With 19 turns of 0.90 wire this motor will kick 24,000 to 25,000 rpm at you. Make sure your gearbox is ready for this one. And if that's not enough, the LeMans 240SB

should cover what little part of you is not satisfied. This version of the 240 has 19 turns of double 0.65 wire around its armature and produces a mind-blowing 29,000 to 30,000 rpm for generating lots of torque and dirt-kicking speed in one small package.

This should give you a good idea of what might suit your needs but if there's still some doubt in your mind, how about talking to the competition? I've found that the best source for what works and what doesn't is my fellow racers. But keep in mind your local track rules, not every motor is legal in every class or club. Also keep in mind that sometimes improving your driving skills is more beneficial than improving your car's performance.

Good luck and happy motoring!

Fred Murphy, c/o Radio Control Car Action, 632 Danbury Rd., Wilton, CT 06897.

**The following is the address of the company mentioned in this article:*

Great Planes Model Distributing, P.O. Box 4021, Champaign, IL 61820. ■

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KYOSHO STINGER

(Continued from page 85)

jump—and the excellent suspension the Stinger inherited from its predecessor, the Optima. I was impressed with the cornering ability of the Stinger: with its mid-engine design, the car sucked into each turn without any sliding or spinning-out, enabling me to put the pedal to metal.

A unique advantage of gas-powered cars over electrics is the duration of a tank of fuel (about 20 minutes), which allows for more time on the track. Also, unlike electrics, gas-powered cars can be run consecutively without the burden of recharging battery packs—just add fuel and go!

The Stinger delivers the performance that R/Cers expect from a competitive racing buggy. The scale-like sounds, power, speed and unmatched maneuverability make the Stinger an exciting racing machine. The beauty of this car is that it can be run on any 1/10-scale off-road track and will blow the competition away.

Kyosho offers an array of options, such as different tires and shocks, but I feel the only option for improvement would be a complete ball bearing set.

If you can handle *being* stung, a

Stinger is the natural choice!

**The following is the address of the company mentioned in this article:*

Great Planes Model Distributors Co., P.O. Box 4021, Champaign, IL 61820. ■

AYK RADIANT

(Continued from page 40)

unit. FPS-28 servos were used for steering and throttle for the Radiant with absolutely no need for custom fitting in the chassis. Everything fit.

Tires fitted to the Radiant are directional knobblies with low profile and sharp sidewalls. They should work well on most terrain. Just make sure you follow the correct tire direction or you may find sliding a problem.

PERFORMANCE. With the Radiant all put together, the fun begins, provided you're not in the wrong place! Not ever having had a real zinger of a four-wheel-drive car before, I mistakenly decided to open up the Radiant on the kitchen floor—I instantly got four rubber skids on the tile and an angry wife! After 15 minutes of scrubbing floors, we took on the front yard.

The Radiant has some real guts for a stock-motor-equipped four-wheel-drive car. It really moves out, laying all four

tires worth of rubber onto the concrete and dirt anytime you floor it. Turning radius isn't as tight as one would like at first, but then when you remember that you can power through a turn with all four tires smoking, you find that you don't need as much radius. The suspension worked very well, allowing no airborne rebound and no bottoming. This is nice to know.

In the dirt the Radiant does her job well, turning dirt to dust and then throwing it all over the place. Makes you feel nice when someone tells you to get out of the lot because you're throwing dirt all over the place! The Radiant seems to handle the jumps quite well, also. She travels a bit nose-down, but with the nose end being quite short, the front tires are normally there to take the landing before the chassis does.

The Radiant has really shown what AYK can do when it comes to making it in a tough, four-wheel-drive environment. It follows current four-wheel-drive trends that are tried and true, and then improves on them. I only corrected one thing in the whole car: I had to place a flat on the idler shaft that the spur gear and chain gear mounts to in order to get setscrews to stay

(Continued on page 103)

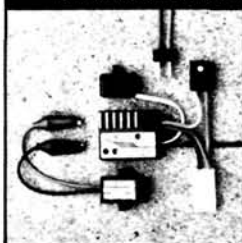
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CX-II MOS/FET SPEED CONTROL



For 1:12 and 1:10 scale racing, forward only with FET braking. Pulse checker included. (Optional heat sink available.)

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Voltage:	6—9.6v
Capacity:	75A (continuous) 220A (surge)
Loss resistance:	0.015 ohm
Dimensions:	1 1/2" x 1 1/4" x 1 1/16"
Weight:	0.97 oz. (w/o switch or connectors)
Mini connector:	KO or Futaba
KO connector:	NO. 424080
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RM-7 MOS/FET PRO SPEED CONTROL

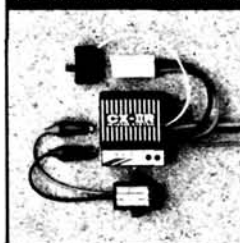


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Voltage:	6—9.6v
Capacity:	150A (continuous) 450A (surge)
Loss resistance:	0.008 ohm
Dimensions:	1 7/16" x 1 3/16" x 9/16"
Weight:	1 oz. (29g)
Mini connector:	KO or Futaba
KO connector:	NO. 424085
Futaba connector:	NO. 424086

CX-III MOS/FET SPEED CONTROL w/REVERSE



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\$119.99 retail
\$89.99

Voltage:	6—8.4v
Capacity:	80A (continuous) 220A (surge)
Loss resistance:	0.015 ohm
Dimensions:	1 9/16" x 1 7/8" x 1"
Weight:	83.2 oz. (w/ switch and connectors)
Mini connector:	KO or Futaba
KO connector:	NO. 424083
Futaba connector:	NO. 424084

Quality KO Propo electronic speed controls make high performance simple. Advanced MOS/FET electronics and components reduce voltage loss to a minimum, solid state amplifier circuitry provides the ultimate in reliability. Three KO Propo MOS/FET speed controls are now available, all adjustable and complete with LED pulse checker (no voltmeter necessary).

At your KO PROPO dealer or direct from:

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What's New

SG COYOTE



The SG Coyote is a genuine race-ready kit that features all the competition options as standard equipment, such as precision ball bearings for differentials and wheels, machined and hardened steel gears for low friction and a mid-mounted motor that provides optimum weight balance. The Coyote is available in 2WD front or rear, and 4WD versions. The modular construction allows quick changing from 2WD to 4WD in minutes.

For more info on the SG Coyote contact United Model Distributors (301 Holbrook Dr., Wheeling, IL 60090).

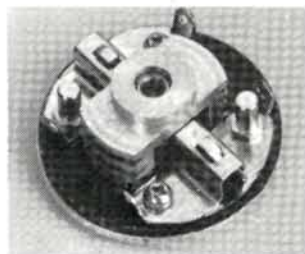
PRO-TRACK RADIO TRAY COVER



One of the chief complaints regarding the Fox has been the inability to make even simple adjustments under the interior dust cover quickly. Pro-Track's Fox Easy-Access Radio Tray Cover Kit overcomes this problem by providing a permanent mount for the rear end and full protection for receiver and interior components, thus allowing quick access to the receiver, speed control and servos. Additionally, the car can be tested and fine-tuned before replacing the tray cover and body. The kit includes an anodized aluminum rear end mount and removable Lexan tray cover and all the necessary mounting hardware. No drilling is required. Complete changeover to this kit can be accomplished in about 15 minutes with no additional modifications to the chassis.

For info on this and other new products—Fox nerf bars, front and rear bumpers, motor brush hood heat sinks, a modified rear wing kit, to name a few—contact Bob Herman, Pro-Track Corp. (P.O. Box 441, Elyria, OH 44036-044).

NEW FROM PARMA



The Turbo Intercooler Aluminum Endbell, No. 11001, is a direct replacement for Yokomo and Kyosho motors. The aluminum alloy eliminates the problem of melted plastic endbells.



The Parma Sly One body, No. 10230CP, for the Tamiya Fox is now available custom painted. Each body is sprayed with Parma's specially formulated paint that won't crack, chip or peel when used on Lexan.



The Parma Grasshopper is now offered custom painted. Each No. 10213CP body is sprayed with a striking combination of Parma's specially formulated paint that won't crack, chip or peel when applied to Lexan.



Parma's 12-volt 60-watt Soldering Iron, No. 13801, has the heat for any soldering job. With its attractive wooden handle and superior heating capabilities it's a must for any hobbyist.

For more info on these *Paraproducts*, contact Parma International, Inc. (13927 Progress Pky., N. Royalton, OH 44133).

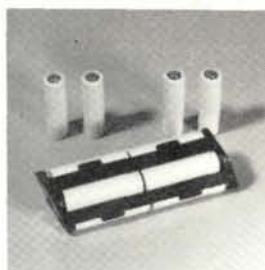
CMW RELEASE



The CMW 4x4 Quick/Slow, AC/DC quick charger features a 0-20 minute electronic timer with built-in alarm at the end of the charging cycle and a LED charging indicator. It has a quick/slow selector switch. At quick-charge mode, the charging will shift from quick charge to slow trickle charge at the completion of the quick-charge cycle to top-off the battery. Comes with fuse protection, 110-volt A/C wall plug, 12-volt cigarette plug and Tamiya connector.

For more info contact CMW International (2101 Midway Rd., Ste-250, Carrollton, TX 75006).

FROM RPS



Convert your two-channel transmitter from expensive throw-away batteries to rechargeables? This set of eight rechargeable 450 MA Ni-Cd Sanyo batteries, No. 6030, will pay for itself in the first four hours of operation. These cells slip into the standard battery holder of most popular two-channel radios.



These Team Losi Hi-Bite Tires, No. 5010, produce superb handling characteristics in varying track conditions. Tests of hundreds of combinations of materials, textures, contours and durometers (hardness) resulted in this low-profile, hi-bite knobby.

For more info, contact Ranch Pit Stop Distributing (1655 East Mission Blvd., Pomona, CA 91766).



Team Losi Aluminum Wheels (No. 5070-5077) are high-quality, precision-machined and guaranteed to add that scale-like appeal to your car. Available in a variety of styles for the Yokomo, Associated RC-10 and Optima.

NEW FROM FIVE STAR



Atlantic Brass Co. announces its Five Star brand Molybdenum and Teflon (Dupont T.M.) Greases in precision grease guns, Spray Oil, Racing Spray Oil and Racing Spray Motor Cleaner for the perfect maintenance and race tune-up of all R/C vehicles. Keep that car well lubricated to give long life and optimum runs while helping to save on those expensive part replacements. Write for the current catalog: Atlantic Brass Co. (P.O. Box 304, Farmington, MI 48024).

HOBBY SHACK KO EX-5



Hobby Shack's latest addition to their trigger radio line, the KO PROPO EX-5 that includes advanced pistol-grip design, thumb-wheel control of steering rate, push-button reverse switch, and wiring for Ni-Cd installation. The receiver is micro-size with excellent range and interference rejection and narrow bandwidth. Servos are high torque, high speed, and water resistant.

For more information contact Hobby Shack (18480 Bandilier Circle, Fountain Valley, CA 92728).

NEW FROM MRC/ TAMIYA



The MRC SO1295 8.4-volt Battery Adapter helps our new Goldpower 8.4-volt battery with its special connector to vehicles and accessories already wired for the Tamiya 7.2-volt battery. There's no wiring involved, just snap the connector in place between the Goldpower battery and your 7.2-volt Tamiya connector.

For further information on this product contact Mr. Fred E. Fischer (2500 Woodbridge Ave., P.O. Box 267, Edison, NJ 08817).

What's New

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Radio Control Car Action**, nor guarantee of performance or safety by **Radio Control Car Action**. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Radio Control Car Action**.

NEW PACESETTER PRODUCTS



The 1/4-scale Vaporizer is a top fuel streamliner dragster, 84 inches long and capable of speeds of more than 100 mph, now being marketed by PaceSetter Products (930 West Hyde Park Blvd., Inglewood, CA 90302). Built in minute detail to resemble fast-track dragsters, the Vaporizer is gas-powered, uses two-cycle oil (20:1 or 40:1 ratio) and can operate on either a standard 2.3-horsepower Quadra engine or an optional 4-horsepower engine. Both engines are extremely lightweight, and have three main bearings. The frame and roll-cage are made of aircraft-grade tubular steel and are heli-arc-welded to produce a durable, reliable vehicle. A centrifugal clutch permits easy starts, smooth idling and fast accelerations. Powerful internal dual disc brakes ensure positive stops. Heavy-duty precision-sealed ball bearings at every high-load point guarantee the Vaporizer a smooth ride. Lightweight, ultra-high traction, high-density foam tires are mounted on spun aluminum wheels. A Futaba pistol-grip wheel remote control, effective up to a quarter of a mile, is optional.

PACER PRODUCTS



Plasti Zap, designed and formulated for use with plastics, will bond light plastic parts, clear windshields, bumpers, light lenses or broken parts. Takes two minutes to fully cure. Zip Kicker may be used with this product for instantaneous bond. Contact Pacer Tech (1600 Dell Ave., Campbell CA 95008).

AIRTRONICS SR2P



The new Airtronics SR2P is an advanced yet economical pistol grip R/C system designed for use in either R/C cars or boats. The SR2P includes necessary features such as servo reversing-switches on both channels, throttle and steering trim adjustments, interchangeable crystals on both transmitter and receiver (available on all 27 and 75 Mhz frequencies), and a compact, lightweight receiver. This innovative radio system is an excellent entry-level pistol-grip radio for the value-conscious modeler who demands Airtronics' reputed quality!

For more low-down info contact Airtronics, Inc. (11 Autry, Irvine, CA 92718).

NEW FROM BOLINK R/C CARS



BoLink's newest 1/10-scale dirt-oval-racing Firebird body is patterned after the full-scale late models being raced throughout the U.S. The body is shown with BL-2733 Air Dam kit installed. This kit gives you the material, full-size templates and the hardware necessary to install the side dams and an adjustable rear spoiler so you can set it for different track conditions.

For more info contact BoLink R/C Cars (420 Hosea Rd., Lawrenceville, GA 30245-4695).

NEW FROM CRP



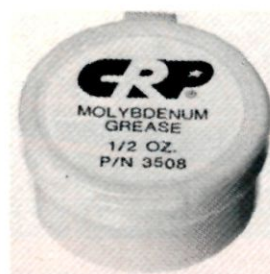
Rear Shock Bracket for Fox, No. 1615, is a direct replacement aluminum shock bracket that mounts stock shocks in a higher position to reduce rear axle binding. Also lets you mount longer-throw shocks.



Heat Shrink Tubing, No. 2162, comes in a package containing 12 4-inch-long pieces of shrink tubing, six 1/8-inch red, and six 5/32-inch black. For motor and battery wires, receiver wires, etc.



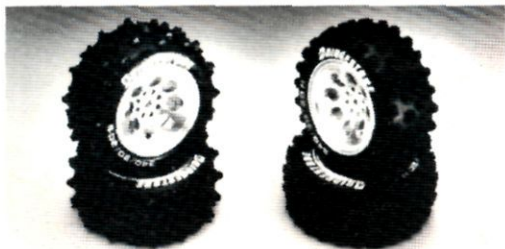
Discharge Resistors, No. 2161, come without connectors so you may adapt your own plugs to match your battery packs with No. 2154, 2159 or 2160 connectors.



CRP's Moly Grease will add that extra lubrication to moving parts. Comes in an easy-to-handle (1/2-ounce) container with re-closeable lid.

For more info on these items contact Custom Racing Products (3250 El Camino Real B3, Dept. 6F, Atascadero, CA 93422).

KYOSHO OPTION HOUSE ACCESSORIES



Kyosho Low-Profile Tires will improve road handling on 1/10-scale buggies. Their low-distortion design and special spikes make these the best tires for all-out performance and they're available for either dirt or asphalt surfaces. Also available from Kyosho are two different sizes of Sponge Tires for indoor buggy racing. Kyosho Treaded Tires are good for wet asphalt or soft dirt surfaces. Spiked Tires are best for hard dirt tracks.



Kyosho Adjustable Pressure Shocks are oil-filled, coil-over, gold-anodized aluminum shocks that were designed to fit the Kyosho Optima, Javelin, Rocky and Assault, but they'll fit other 1/10-scale cars with some modifications. Three separate sets of pistons are included, which allows you to vary the internal dampening from soft to very firm. Not only is spring tension adjustable, but three sets of color-coded springs are included in three different stiffnesses. Triple-sealing makes these shocks nearly leak-proof. These shocks are available in two sizes. The small shocks are 4 inches long with a total travel distance of 1 inch.

For more info on these performance products contact Great Planes Model Distributors Co. (P.O. Box 4021, Champaign, IL 61820).

NEW FROM MRP



Mr. Dusty, No. 30-1151, is a dust cover designed to keep the dirt, dust, and mud out of your RC-10. Molded from lightweight Lexan, Mr. Dusty helps keep you from hauling half the track 'round while adding scale touches—like the molded dash complete with instruments.



The Lamborghini C-2, No. 30-1126, is the newest racer on the IMSA and GTP circuit. Now you can run this stylish shell on your car. It'll turn your 1/10-scale off-roader into an on-road racer. It's available now in Lexan! and soon to be released are 1/12-scale (No. 50-0958) and 1/8-scale (No. 40-2329) versions!

For more info on these great new products contact MRP, Inc. (18676-142nd Ave. N.E., Woodinville, WA 98072).

What's New

McALLISTER DECALS



Intimidate the competition with these highly unique and colorful graphics. Your Monster truck or Baja terror will have that stand-out winning look; your adversary will look nervously the other way when brought face to face with the Venom Rattlesnake or the Monster Truck Monster.

For more on these, contact McAllister Racing (4827 Top Circle, Dept. AC, Simi Valley, CA 93063).

FROM CENTRAL BUILDERS



This high-tech 1/8-scale PB Nova X5 4WD racer features two-speed gearbox, quick-change hubs, coil-over shocks, ball-and-pin shafts with front- and rear-belt drive, adjustable torque limiter (front), variable front drive ratio with adjustable, active rear suspension geometry. Aircraft alloy pod with glass-filled nylon suspension components.

Contact Central Builders Supply Co., Hobby Div. (P.O. Box 152, Island Park, Sunbury, PA 17801).

FUTABA ATTACK

The Futaba Attack 2NBL/AM two-channel system is ideal for the R/C novice. The Attack system features the new R102GF battery eliminator circuitry (BEC), the two-channel integrated BEC that extracts the highest level of performance from your model. BEC provides power to the receiver and servos from your model's motor. The Ni-Cd pack reduces your car's weight for improved handling response and quicker acceleration. You can even brake deeper into the corners. The system includes two S128 servos, switch harness and R102GF BEC. Available on 27, 72, and 75 MHz.

The radio for the racer on a budget. The new 2P is a no-frills system delivering Futaba quality and reliability. Magnum Sport fea-



tures a better grip and feel, superb balance and even a steering wheel that's adjustable for spring tension and lock-to-lock throw. System includes R2GS receiver, two S28 servos with reverse feature, switch harness and battery case. Available on 27, 72 and 75 MHz.

For more info on these hot new items contact Futaba Corp. of America (555 W. Victoria, Compton, CA 90220).

FAST WING



Designed by Fred Campbell of The Racers Pit Stop, these 1/10-scale, Aluminum Sprint-Car Wings come in two designs, roll-over or flat-sided. Both kits include a smaller front wing and are of universal type mount. These three-ounce durable wings can take abuse and still have a limited one-year repair/replacement warranty. Part numbers are FW-01 for the flat-sided, and FW-02 for the roll-over. For prices and shipping info contact: The Racers Pit Stop (1 Arch St., Naugatuck, CT 06770).

AYK RADIANT

(Continued from page 90)

put, a real small price to pay for a real nice car. This one will be a serious competitor—see for yourself.

*The following are the addresses of the companies mentioned in this article:

R/C Race Prep, 20115 Nordhoff St., Chatsworth, CA 91311.

Parma International Inc., 13927 C Progress Pkwy., North Royalton, OH 44133.

Futaba Corp. of America, 555 West Victoria, Compton, CA 90220. ■

BIG GRIZZLY

(Continued from page 60)

since sent me a set of the new beefier ones that are now included with the later kits, and this problem has become history. Varicom is well known for their excellent customer service.

Other than these few items the Grizzly assembly went very smoothly. As I've already stated, the "problem" areas have been corrected in the later production run kits.

I used Hobby Shack's EX-5 KO PROPO radio and their CX-IIR MOS/FET with reverse speed controller. I have a number of KO radios and so far have

(Continued on page 104)

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BIG GRIZZLY

(Continued from page 103)

not had any problems at all. In fact, one of them is in an electric fastboat and even after several dunkings the radio still performs flawlessly. In light of the size, looks, and its intended use, I decided to go with a high-rpm motor and a smaller pinion gear for stump-pulling power. I installed an Aristocraft Technopower RX-540SD motor, distributed by Polk's Model Craft Hobbies*, with adjustable brushes and commutator timing. This is one of the smoothest running powerhouses I've come across. The Aristocraft Technopower gets its silky running qualities from ball bearings and a precision-balanced armature. Nothing takes the place of good balance!

PERFORMANCE. Considering the Grizzly comes with three pinion gears, 13-, 14-, or 15-tooth, it's easy to understand why the model can acclimate to many driving conditions, from mud-flying hill climbs to higher-speed hard dirt conditions. Personally, I felt the lower-end power with a hot motor, like the Polk's Technopower, was the way to go. As it turned out the lower ratio proved great in hill climbs and mud, but the 13-

tooth pinion also gave very good running times. For good duration and to fight motor overheating, a lower ratio is always better. As with any R/C car, especially a 4WD, make certain all moving parts run free with no binding. The Grizzly also comes with a heat sink to keep the motor cool. If, however, you do want greater top speed, the other two pinions will give it to you. I simply felt the top speed with the 13-tooth pinion was quite realistic for a car crusher.

The model as I set it up was a whole lot of fun with its wheels that scaled things I've never scaled with an R/C car before and tracked well with a slight amount of toe-in. The front shocks were on the soft side, but I did enjoy watching the suspension work. It really doesn't matter anyway if you happen to prefer a stiffer suspension. As I understand it, Varicom is going to offer stiffer springs, oil-filled shocks, and an entire ball bearing set for the competition minded. With a carefully built, hopped-up Big Grizzly, have mercy, you just might maul the local rival.

**The following are the addresses of the companies mentioned in this article:*

Varicom Industries, 18480 Bandilier Circle, Fountain Vally, CA 92728.

*Polk's Model Craft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304. ■

TYCO HOPPER

(Continued from page 62)

car and radio. Recognizing this problem, and knowing the demand for an R/C car for the average off-road fan, Tyco Industries* has introduced a cute little dirt eater called the Turbo Hopper.

The Turbo Hopper is a completely assembled, ready-to-run 1/12-scale off-road car. It comes with its own radio system, transmitter and all, and all you need to do is add batteries. It's wonderfully simple and neat.

While not a competition vehicle, the Turbo Hopper offers exciting R/C off-roading fun for virtually everyone. The simple transmitter is a two-stick, two-channel, point-to-point control unit. Even those people who shy away from high-tech toys can effectively run these cars within minutes after being handed the radio.

The cars themselves are very well built. They feature a full spring friction suspension at both axles. The front is carried by single wishbone-type suspension arms carried by spring friction shocks. At the rear we find the live axle beam rear end carried by two spring friction shocks. The

(Continued on page 106)

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TYCO HOPPER

(Continued from page 104)

motor and axle assembly pivots at the rear of the chassis and is suspended by the shocks.

Although the radio is a point-to-point type system, the car handles it well. Two speeds forward are given, one normal and one "turbo" speed which provides a 22% burst of additional speed. It really feels like about a 50% boost and adds lots of fun to the running. The steering function is also point-to-point, giving either full left turn or full right. The only drawback

to the radio is the fact that steering can only be accomplished while power is applied to the motor and the car is in motion. One adjusts to this quickly, though, allowing the fun to get the best of them.

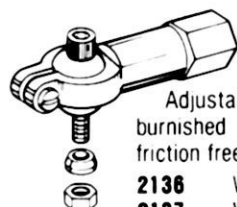
The Hopper has spike knobby rear tires and all-terrain ribbed tires up front. Even a spare front tire is provided, which is mounted to the top of the car. The car requires eight AA batteries for power and they are placed underneath the body shell. Rounding out the car are a rear wing, floodlights, and already applied body detailing.

The driver has a choice of either a red car on the 27 MHz band of operation, or a black car on the 49 MHz band. Tyco does not specify exactly what the frequencies of the cars are, but it's safe to assume that one car on each frequency is the maximum number of cars which can run at the same time on the same front yard.

For this review I was furnished with one of each Turbo Hopper, the red one being immediately claimed by my 6-year-old daughter. This left me to be the "bad guy in black" with the 49 MHz car. With the simple addition of some batteries, the action began.

DU-BRO

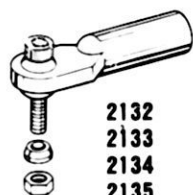
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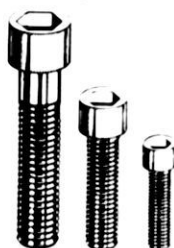
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PERFORMANCE. Indoors on carpet, we found the Turbo Hoppers plenty fast enough to get into trouble with the furniture. This was with the gearbox in the low-gear position. Daughter Melissa soon found that the game of "tag" had a better and more enjoyable meaning. This 6-year-old needed only 4 minutes to master the transmitter and soon had her father running for cover to avoid being tagged.

Moving outdoors we put the Turbo Hoppers in high gear and found that they could really scoot. It didn't take long for Melissa to discover something other than paved asphalt, and this made for her first excursion into the dirt. Going back to low gear, the Turbo Hoppers handled the rough stuff pretty nicely. The suspension handles the dirt well, providing good stability and lots of action for both father and daughter.

In all, the Turbo Hoppers have proven to be quite a deal. My daughter takes hers with her anytime Dad goes anywhere where she'll get the chance to run it. If customer satisfaction is any indicator, both my daughter and I can confidently say that these little cars are super. They're perfect for getting the young ones ready to handle a full competition car later on.

Want to try out a great sport and hobby without investing a lot? I think you'll like the Tyco Turbo Hoppers for starters. Good things do come in little packages.

**The following is the address of the company mentioned in this article:*

Tyco Industries, 540 Glen Ave., Moorestown, NJ 08057. ■

KYOSHO ULTIMA

(Cont'd from p. 73) There was excessive understeer my first time out, but by softening the front springs and tightening the rear springs a little I was able to correct it.

The RS-540S was quick, but not overpowering. Any of the hot Kyosho motors will bolt right into the Ultima. Several gear ratios are also available. The Pulsar radio transmitter is the most comfortable grip that I've ever used. It's balanced so there is very little strain on your wrist.

One very important option is a full set of ball bearings. In the standard kit there are bushings everywhere you want to have ball bearings. The worst feature of all on the Ultima is the plastic bushings for the front tires. These should be replaced with bearings as soon as possible.

Can the Ultima win the world championship? The suspension and chassis certainly are up to it. Bearings and a hot motor can easily be added. Probably the main item Kyosho needs is a world-class driver to run the Ultima. The present two-wheel-drive world-champion manufacturer should keep watching the rear view mirror, the Ultima might be closing in.

**The following are the addresses of the companies mentioned in this article:*

Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

MRC/Tamiya, 2500 Woodbridge Ave., Edison, NJ 08817. ■

POLE POSITION

(Continued from page 53)

might fall out and not be missed immediately, but most are important to the

operation of your car. If there are any screws that you want to stay in place permanently, I suggest you try PIC* Vibra-Jam Sealant. This is new on the market and I've had very good results with it.

200 mph, 500 Miles

The 200-mph lap time and the 500-mile race are standard attractions for full-size racing. Very soon the Indy car crowd will be at the Indianapolis Motor Speedway for the Indianapolis 500.

While a 1/8-scale Indy racer will reach "scale speeds" of nearly 500 mph, that is not enough to draw attention to our sport. I think we've failed to plan or promote our races very well. All too often we're more excited about the number of entries a race has than the amount of excitement it stirs with the local spectators and media. If your club has a mini-Indy 500 race in April or June, for Can-Am bodied cars on a road course with a 30-minute main, you're missing the boat. Even if the Can-Am, road course mini-500 took place in May, you'd still not be in the ball park. What you need is an Indy body race on an oval with a 500-lap main for as many cars as you can safely run, as close to Memorial Day as you can schedule it. That type of package should get an article in your local newspaper and coverage from local television stations, especially if you contact them in advance.

I know the full-size Indy cars actually run only 200 laps, but most people would identify a 500-lap mini-500 much more readily than a 200-lap mini-500. Don't fight it; try to use national and regional events to excite people about our sport.

(Continued on page 111)

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Anchorage, AK 99515
Contact: Tim Brass, President 278-4250

AROARA

(Alaska Radio Operated Auto Racing Association)
1/10 Scale Racing Series
4970 Fairbanks St.
Anchorage, AK
Contact: Bob Peters 345-3269

AROARA

1/8 & 1/12 Scale Racing Schedule
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Anchorage, AK
Contact: Bob Peters 345-3269

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Tucson, AZ 85730
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R. C. RACERS INC.
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Lake Havasu City, AZ 86403
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SCALE RACING SPORTS
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(602) 829-9117

CALIFORNIA

AA R/C RACEWAY & HOBBIES
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Antioch, CA 94509
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Vallejo, CA 94590
(707) 557-0302

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Glendora, CA 91740
(818) 963-9517

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11th & Ramirez St.
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(Not a mailing address)
Contact: Harry Jackman (916) 671-6677

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San Diego, CA
Contact: Linda Jones (619) 225-5160



NOR-CAL MINI OFFROADERS
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Redding, CA 96001
(916) 241-3737

ORCA CENTRAL DIVISION
Cycle Arts Racing
3188 N. Marks, #121
Fresno, CA 93711
(209) 233-3665 or (209) 229-9366

ORRCA
P.O. Box 8938
Calabasas, CA 91302
Contact: Lou Peralta (818) 340-5750

PETERBUILT JR. RACEWAY
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San Jose, CA 95110
Contact: Peter Liu (408) 279-0111

RADIO CONTROL RACE CENTER

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Gardena, CA 90247
Contact: Cliff & Rhea Fisher (213) 324-3105

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Costa Mesa, CA 92627
Contact: Ron Williams (714) 631-1555

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Steve Hickman, President

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Harbor City, CA
Contact: Bruce Berteau (213) 539-3611

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Aurora, CO 80012
Contact: Jess Brockman

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Fort Collins, CO 80521
(303) 493-7199

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Denver, CO 80212
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Edgewater, FL 32032

FLORIDA STATE 1/12 SERIES SCHEDULE

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Tampa, FL 33617
Contact: Eric Gudger (813) 985-6158

Race Track Owners: Do you want to attract more racers to your track? Then let them know where you are by listing your name and location in our "Race Track Directory." Each issue **Radio Control Car Action** will publish a listing free (space permitting) of the race tracks around the country. To join in, send your name, address, and telephone number, along with the name of a person to contact for more information, to "Race Track Directory," **Radio Control Car Action**, 632 Danbury Rd., Wilton, CT 06897.

LAKE WHIPPOORWILL INTERNATIONAL SPEEDWAY

12345 Narcoossee Rd.
Orlando, FL 32812
Trackside: (305) 277-9586
Campground: (305) 277-5075

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BOLINK RACEWAY PARK
420 Hosea Road
Lawrenceville, GA 30245
Contact: Bob Rule (404) 963-0252

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4915 W. Rte. 120
McHenry, IL 60050
(815) 344-1777

SSRCCC

(South Suburban Radio Control Car Club)
510 Ingraham
Calumet City, IL 60409
(312) 891-0089/474-7802

INDIANA

BREMEN BANDITS R/C RACING CLUB
BREMEN HOBBIES
308 N. Bowen
Bremen, IN 46506

GONZO RACEWAY

Chesterton, IN
Contact: Jeff (219) 926-4341 or 736-7414

GOSHEN R/C OFF ROAD RACING CLUB

Tim's Hobby Shop
1922 Elkhart Rd.
Goshen, IN 46526
(219) 534-1992

MIDDLEBURY R/C CLUB

Flying High Hobbies Haus
304-A N. Main, Middlebury, Ind. 46540
Contact: Steve or Sharon Mattern
(219) 825-2128

IOWA

IORC

(Iowa Offroad Racing Club)
P.O. Box 22052
Des Moines, IA 50322
Contact: Ron Boone (515) 987-1184

MARYLAND

KING'S R/C CARS
219 East Washington St.
Hagerstown, MD 21740
(301) 739-0080

DUSTBUSTERS R/C CLUB

5004 - 70th Place
Hyattsville, MD 20784
Contact: Jeff Swartz (301) 773-7230

MISSISSIPPI

TEAM RACE R/C CLUB

505 Spring Ridge Rd.
Clinton, MI 39056
(601) 924-3341
Contact: Thomas Bullock after 2 p.m.

MISSOURI

HOBBY VILLAGE AND RACEWAY

112 N.W. Business Park Lane
Riverside, MO 64150
(816) 587-6435

VALLEY RACING

7515 San Diego
St. Louis, MO 63121
Contact: John Shelby 382-7580

NEVADA

CIRCUS RACEWAY

3132 S. Highland
Las Vegas, NV 89109
(702) 732-0022

NEW JERSEY

ATLANTIC HOBBIES RACING WORLD

Elm Plaza, White Horse Pike
Elm, NJ 08037
(609) 567-2947

NEW YORK

N.E.S.C.A.R.

(North East Scale Car Auto Racing)
P.O. Box 118
N. Greece, NY 14515

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Cicero, NY 13039

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Palmyra, NY 14522
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NYROC (New York Radio Operated Cars)

Contacts: Joe Fiero (718) 272-1917
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Contact: Tom Gebhart (716) 392-8208

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Contact: Stan Power (919) 457-3307/278-3898

Track Directory

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T.B.A.

Minot, ND

Contact: John R. Weaver
(701) 727-5120
Or Paul C. Eckert
(701) 727-5984

NORTHERN MINI-RACERS OF MINOT, NORTH DAKOTA

108-2 Sunset Loop
Minot AFB, ND 58704
Contact: John Weaver (701) 727-5120

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1775 Bairsford Circle West
Columbus, OH 43232
Contact: John White, president

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848 Wilder Ave.
Elyria, OH 44035
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906 Eton Rd.
Toledo, OH 43615
(419) 531-0070

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(918) 745-9898

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Milton Freewater, OR 97862
Don Rudy, Secretary

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Blue Ridge Summit, PA 17214
(717) 794-5184

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Suite 900, One Franklin Plaza

Philadelphia, PA 19102
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Burleson, TX
(817) 295-2821



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El Paso, TX
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3109 Jarvis
El Paso, TX 79935
Contact: Bob Blum (915) 593-8015

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4886-A Hercules
El Paso, TX 79904
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Grand Prairie, TX
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(713) 675-7938/455-2893 after 5 p.m.

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Mechanicsville, VA 23111
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Rte. 6, Box 31
Mechanicsville, VA 23111
Contact: Allen, Nancy, or Rick at
(804) 746-5184

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Contact: Ron Birkhead

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S.A.R.C.A.R.

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Contact: Tom O'Hara (206) 784-9656
or Ed Hagan (206) 271-0461

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POLE POSITION

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Open-Wheel Body List

As promised last issue, you'll notice a list of many open-wheel bodies that are presently available. The list includes everything from Formula I and Indy cars to sprint cars and modifieds.

Try to arrange a *mini-500* in your area, and try to get more people into your club this year. And let me hear your ideas about the sport.

Rich Hemstreet, c/o Radio Control Car

Action, 632 Danbury Rd., Wilton, CT 06897.

*The following are the addresses of the companies mentioned in this article:

Associated Electrics, 1928 E. Edinger, Santa Ana, CA 92705.

BoLink R/C Cars, 420 Hosea Rd., Lawrenceville, GA 30245-4695.

McAllister Racing, 4827 Top Circle, Simi Valley, CA 93063.

Model Racing Products, 18676 142nd Ave. N.E., Woodinville, WA 98072.

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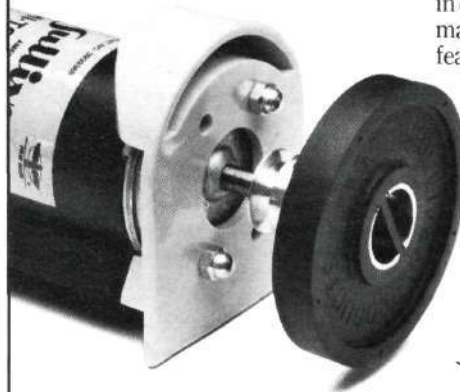
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